Draft

Walla Walla Subbasin Summary

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Northwest Power Planning Council

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The Walla Walla Subbasin Summary has been developed as part of the rolling provincial review process developed by the Northwest Power Planning Council (NWPPC) in February 2000 in response to recommendations by the Independent Scientific Review Panel (ISRP) and the Columbia Basin Fish and Wildlife Authority (CBFWA). This summary is an interim document that provides context for project proposals during the provincial reviews while a more extensive subbasin plan is developed.

The Walla Walla subbasin is one of a number of subbasins included within the Columbia plateau province (Figure 1). The development of a subbasin summary was initiated as part of the provincial review process, started at a November 28-29, 2000 meeting in Pendleton, Oregon.

The Walla Walla subbasin includes all or part of five counties spanning two states: Walla Walla and Columbia Counties in Washington and Umatilla, Union, and Wallowa Counties in Oregon (Figure 2). The Walla Walla drainage is a part of the historical territory of the Walla Walla, Cayuse, and Umatilla Indian Tribes. The land was ceded to the federal government under the Treaty of 1855. The Tribes maintain reserved rights for these lands that include the harvesting of salmon, wildlife, and vegetative resources (U. S. Army Corps of Engineers 1997).

Drainage Area

Draining an area of 4,553 square kilometers (1,758 square miles), the Walla Walla River and its tributaries originate in the Blue Mountains of southeastern Washington and northeastern Oregon and flow north and west to enter the Columbia River at Lake Wallula behind McNary Dam. About 73% of the drainage lies in Washington. Elevations in the subbasin range from about 1,800 meters at mountain crests to about 80 meters at the Columbia River (Figure 3). The eastern portion of the drainage lies in steep, timbered slopes of the Blue Mountains within the Umatilla National Forest. The remainder of the drainage consists of moderate slopes and level terrain.

Climate

The Walla Walla watershed is largely influenced by the Cascade Mountains to the west, the Pacific Ocean beyond the mountains, and prevailing westerly winds. Maritime air masses move to the east where they are intercepted by the Cascade Mountain range, creating a rain shadow effect, which contributes to the arid steppe of the Columbia basin reaching as far as the Blue Mountains. Elevation is another major factor affecting the climate within the watershed, as it varies from warm and semiarid in the western lower part of the river valley to cool and relatively wet at the headwaters in the Blue Mountains. Temperatures exhibit a large seasonal variation with maximum temperatures rising above 38°C (100°F) in the summer and falling below –18°C

(0°F) in the winter (U. S. Army Corps of Engineers 1997). Average monthly high temperatures from June through September range from 67°F in the lower elevations to 54°F at higher elevations.

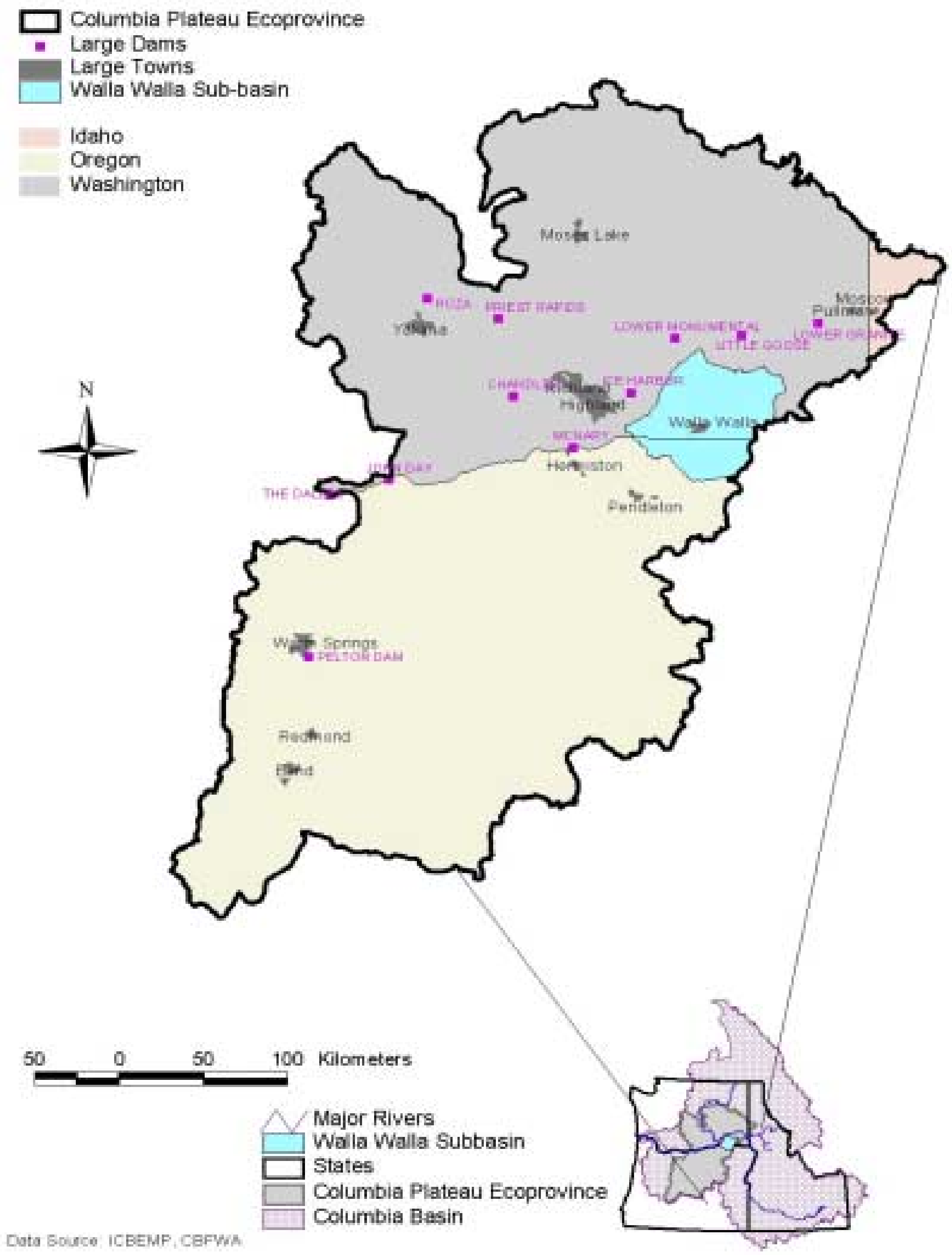

Figure 1. Location of the Walla Walla subbasin within the Columbia plateau ecoprovince.

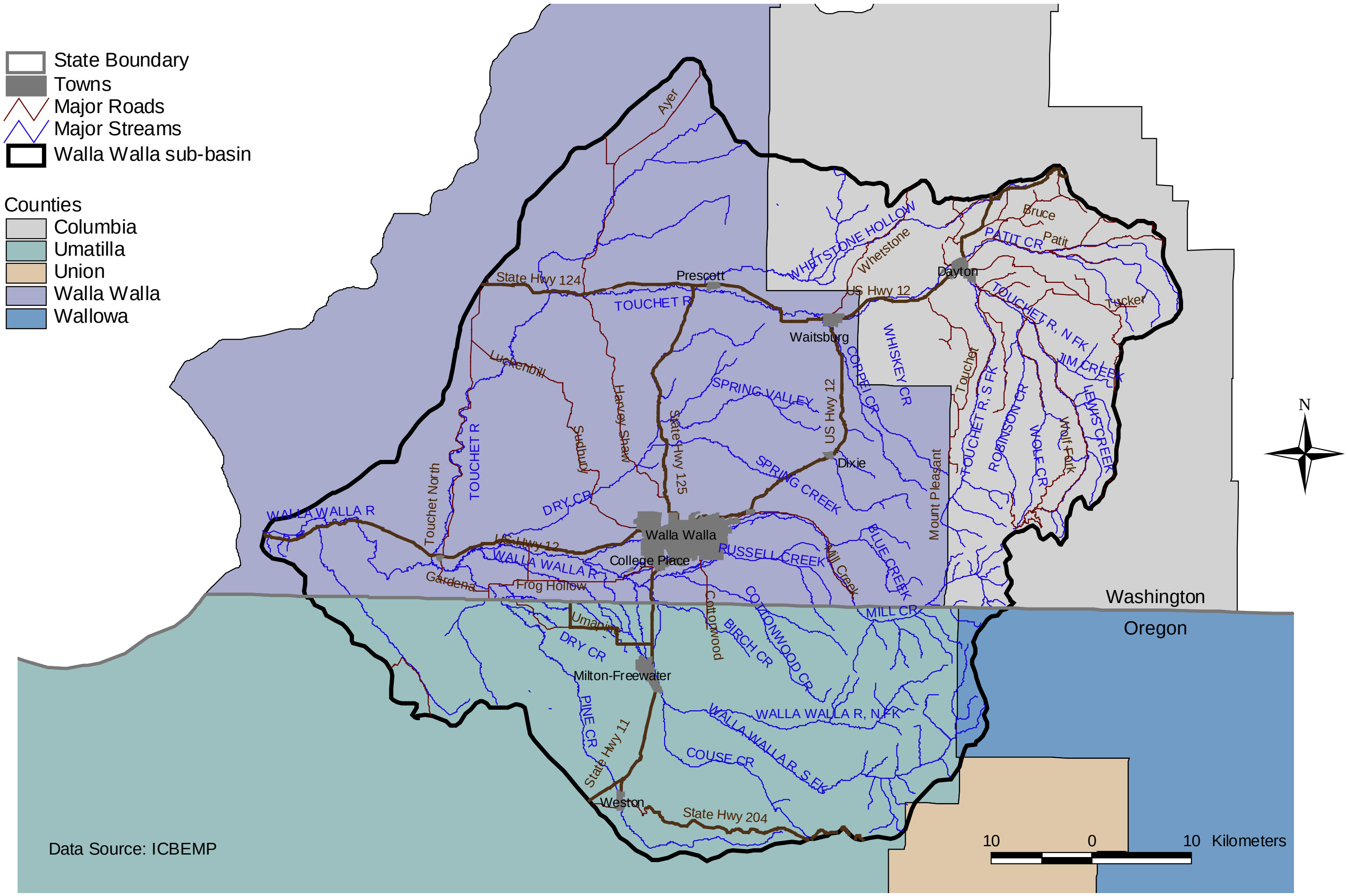

Figure 2. The counties, towns, major roads, and major streams contained within the Walla Walla subbasin.

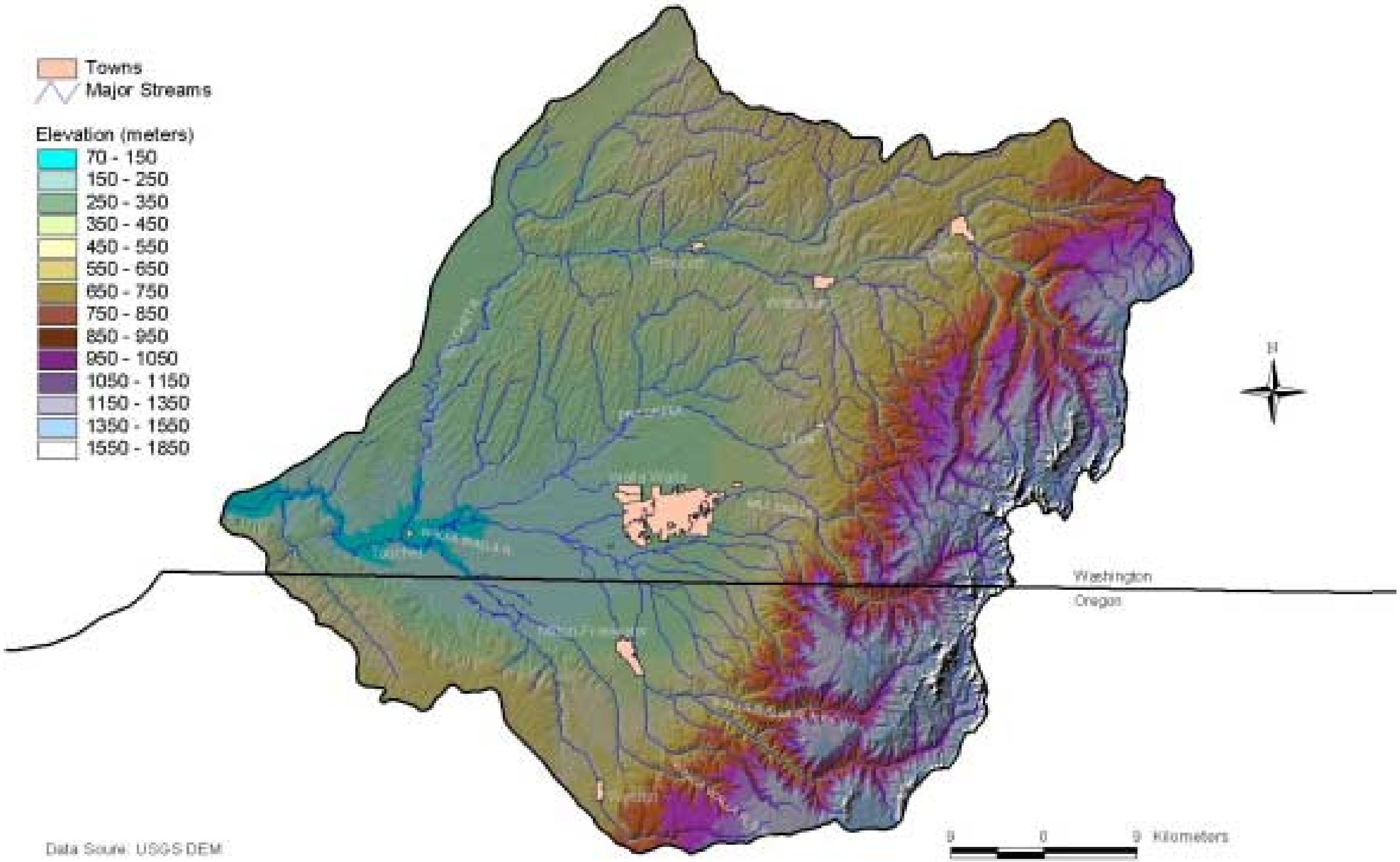

Figure 3. Elevation and topography of the Walla Walla subbasin.

Precipitation across the Walla Walla subbasin falls mainly in the winter, with 64% occurring from October through March (Newcomb 1965). The lower elevations in the watershed experience precipitation primarily as rain, while higher elevations primarily receive precipitation as snow. Annual precipitation near the mouth of the Walla Walla River is less than 25 centimeters (Figure 4). Precipitation increases progressively eastward with elevation, with the headwaters receiving over 100 centimeters (40 inches) annually (U. S. Army Corps of Engineers 1997; Figure 4). Thunderstorms occur on average only 11 days per year, mostly during the summer months, but they are extremely intense and have produced torrential flows causing major fish kills and sediment deposition.

Geology and Soils

As the river winds its way through the Walla Walla watershed, it crosses two major physiologic provinces: the Blue Mountains and the valley lowland (Newcomb 1965). The Blue Mountains dominate the topography of the basin with an average elevation of 1,500 meters (5,000 feet) along the subbasin boundary, the highest point being Table Mountain at 1,800 meters (6,000 feet). The topography of the Blue Mountains province consists of flat-topped ridges and steep stair-stepped valley walls formed by thousands of feet of Miocene basalt flows that engulfed the folded, faulted, and uplifted granitic core of the mountains. As mountains were uplifted, streams and glaciers carved canyons through the basalt layers. The valley lowland extends from the center of the basin north to the divide between the Touchet and Snake Rivers and south to the Horse Heaven Hills. Land surface elevations of the lowland province range from 750 meters (2,500 feet) at the base of the Blue Mountains to less than 81 meters (270 feet) at the confluence with the Columbia River.

The dominant bedrock across the region consists of a series of basalt flows known as the Columbia River basalt that are stacked like a layer cake across much of eastern Washington, eastern Oregon, and southern Idaho. Dating from 10 to 17 million years before present, the basalt is divided into formations, each an aggregation of individual flows sharing similar flow histories and geochemistry. The three major formations that occur in the Walla Walla subbasin are the Saddle Mountains, Wanapum, and Grande Ronde. The flow thickness can range from five feet to as much as 150 feet, and collectively is estimated to be hundreds to thousands of feet thick (Newcomb 1965). The topography of the basin is directly related to the folding, faulting, and erosion of these formations, creating a regional structure that dips westward from the Blue Mountains, southward down the Touchet Slope (the area between the Walla Walla and Touchet Rivers), northward from Horse Heaven Ridge, and eastward from a dividing ridge in the lower Walla Walla valley (Newcomb 1965).

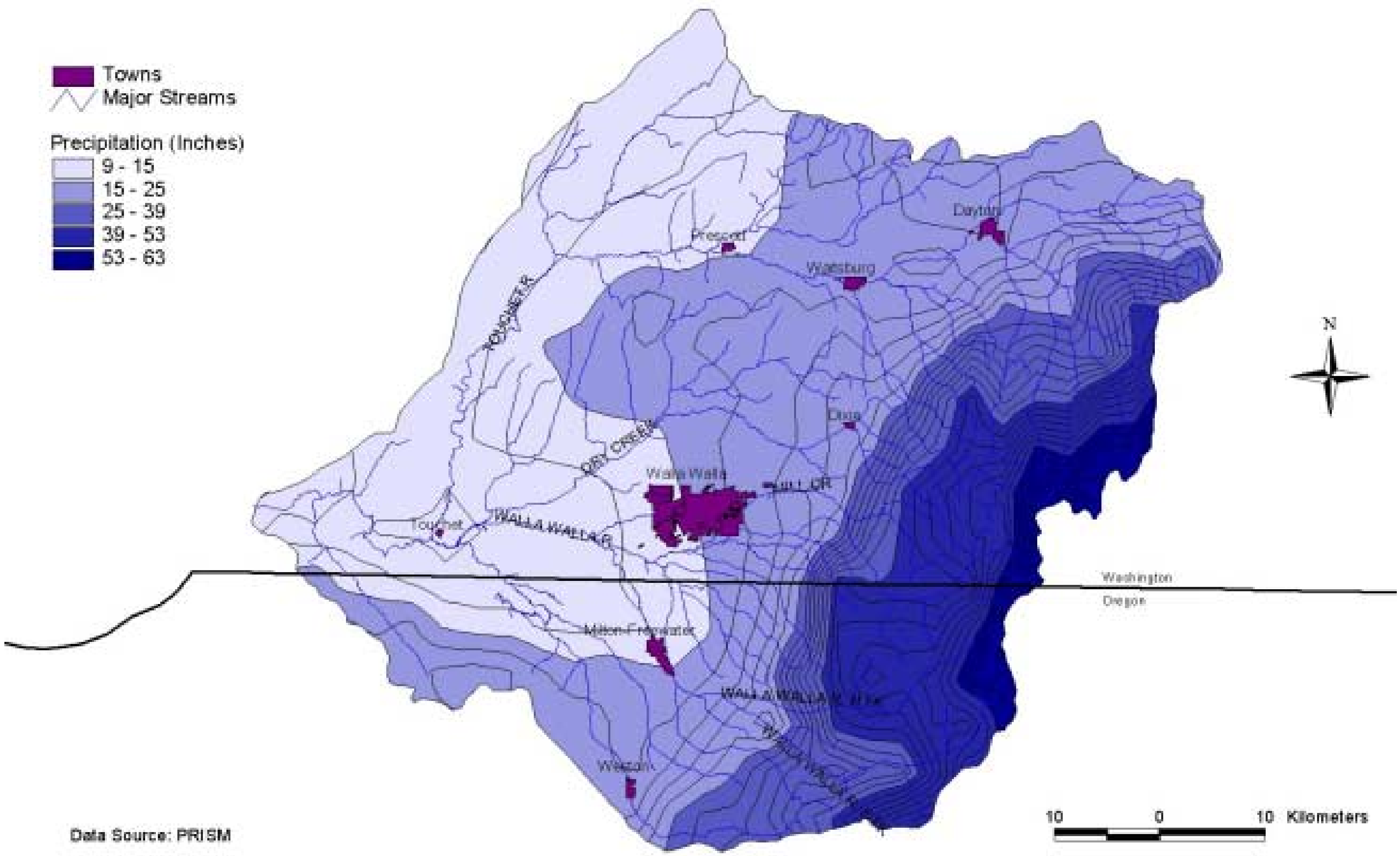

Figure 4. Precipitation patterns of the Walla Walla subbasin.

Fertile soils formed from Pleistocene silt and sand blanket the subbasin. During the Pleistocene ice ages, the region underwent severe change as the continental glaciers advanced and retreated to the north, and valley glaciers carved channels in the higher elevations. The oldest of the Pleistocene deposits was washed down from the canyons of the Blue Mountains and are referred to locally as the “old gravels and clays” (Newcomb 1965). These deposits filled the structural troughs formed by the folding of the basalt layers in the Walla Walla subbasin. Massive floods swept through the Columbia basin periodically through the quaternary era, bringing vast amounts of sediment into the region. Wind, intensified by the expanse of glacial ice, piled the sand and silt known as loess into dunes that spread across much of central and southeastern Washington. These dunes characterize the region known as the Palouse, and can be seen throughout the Walla Walla subbasin. The Touchet beds are another reflection of Pleistocene glaciation and climate. They represent cyclic slow water deposits laid down when massive floods resulting from the breaching of an ice dam located near Missoula, Montana scoured the area and backed up into the mouth of the Walla Walla River (Alwin 1970).

Hydrology

The Walla Walla River flows out of the Blue Mountains, originating at nearly 1,800 meters (6,000 feet) and flows through narrow, well-defined canyons. After it leaves the mountains it flows through broad valleys that drain low, rolling lands (U. S. Army Corps of Engineers 1997). The principle tributaries of the Walla Walla River include the Touchet River, Mill Creek, and the North and South Forks of the Walla Walla River (Table 1).

Table 1. Drainage area and runoff of major tributaries in the Walla Walla subbasin (U. S. Army Corps of Engineers 1997)

Drainage	Drainage Area (sq km)	Drainage % of subbasin	Average Annual Runoff (acre/feet	Runoff % of subbasin
South Fork Walla Walla (near Milton-Freewater	**163**	**4**	**139,000**	**30**
North Fork Walla Walla (near Milton-Freewater	**88**	**2**	**39,200**	**8**
Mill Creek (near Walla Walla)[1]	**154**	**4**	**69,073**	**15**
Touchet River (at Bolles)	**935**	**22**	**180,300**	**40**
Local Runoff (remainder of subbasin)	**2,857**	**66**	**37,500**	**8**
TOTAL (Walla Walla River near Touchet)	**4,292**	**100**	**462,000**	**100**

[1]Values shown represent the data collected at gauge site #14013000, located upstream from Walla Walla, WA. This site was selected since flows measured are uninfluenced by diversions.

Precipitation trend analysis shows a high degree of variability in the amount and timing of rainfall in the Washington portion of the Walla Walla subbasin (Pacific Groundwater Group 1995). In the spring when temperatures warm, rain and snow pack melt supplement the dwindling precipitation to maintain high flows and occasional flooding. As precipitation wanes in early summer, the area actively contributing surface water shrinks; large intermittent streams such as those draining the area north of the Touchet River begin to dry up, reducing the drainage network to the streams flowing out of the Blue Mountains (Figure 5). The intermittent watersheds in the lower subbasin have minimal flow during the summer months, except during large precipitation events. Average monthly flows for the major rivers and tributaries in the Walla Walla subbasin are shown in Table 2.

Most flooding events result from rain-on-snow events. This most commonly occurs when snow accumulates between 450-1,200 meters (1,500-4,000 feet) in the Blue Mountains and then is rapidly melted by rain and warm winds (Washington Department of Natural Resources 1998). Fifty-eight percent of the Walla Walla subbasin falls within the 450-1,200 meter (1,500-4,000 feet) range in what is termed the transient snow zone, an area that substantially contributes to the flood regime in the subbasin (Figure 6). The most damaging floods occur December through February. A second common mechanism for flooding is rain-on-frozen soil events, which generally affect the lowland agricultural areas. These events often lead to high surface erosion in agricultural lands. A less common flooding mechanism is heavy summer thunderstorms. Significant flooding has occurred 26 times since 1865.

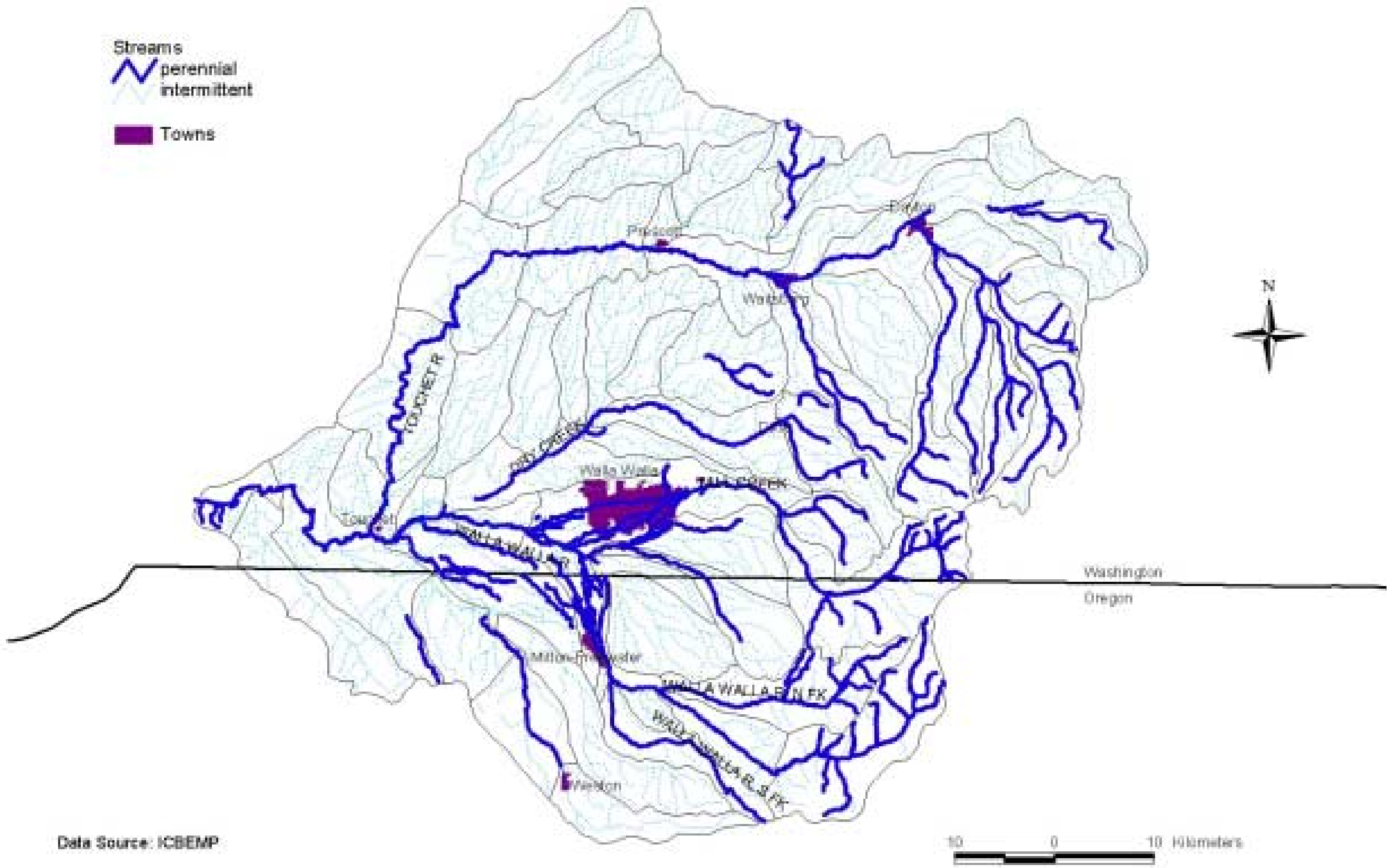

Figure 5. Intermittent and perennial streams of the Walla Walla subbasin.

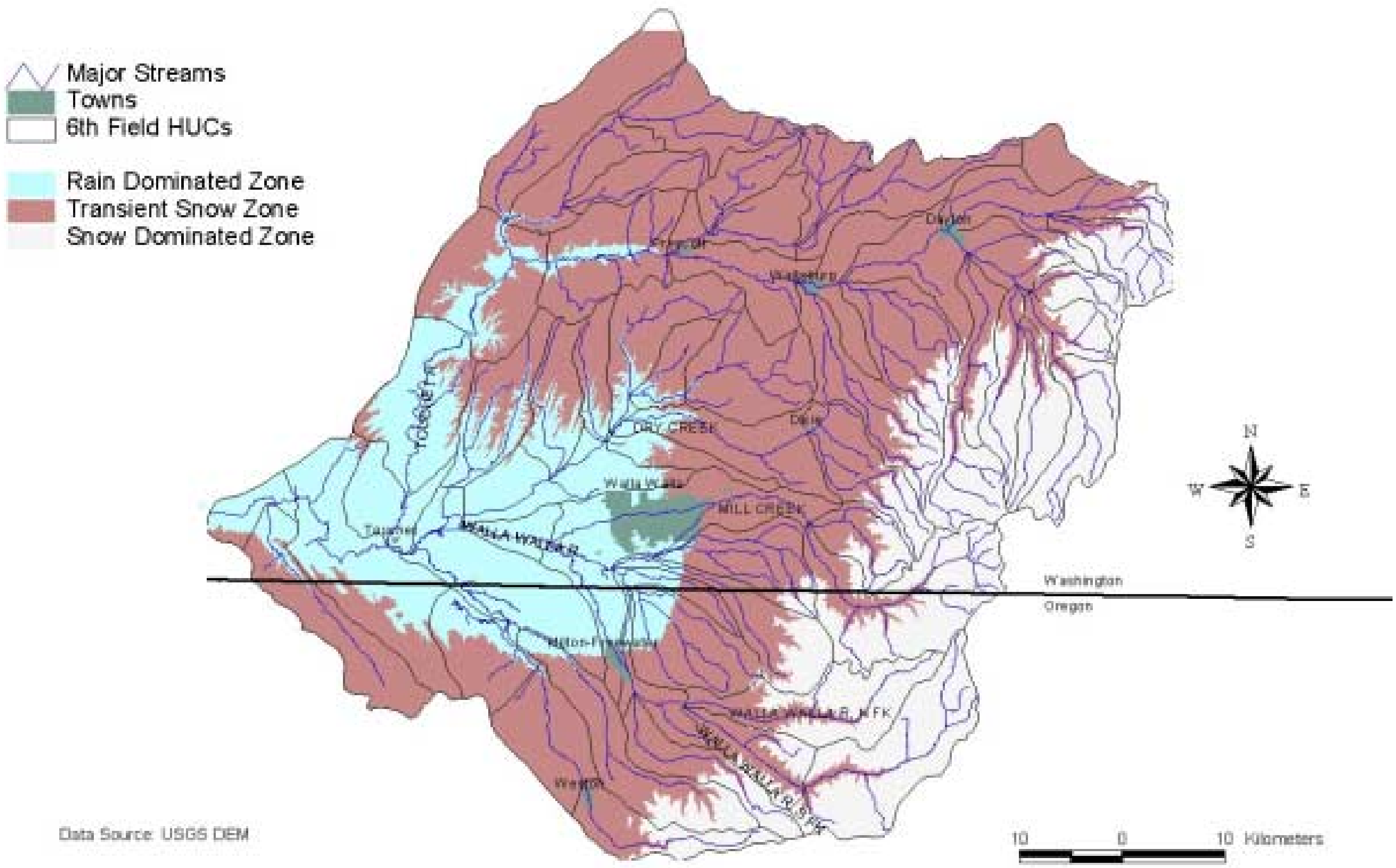

Figure 6. Transient snow zone elevation band in the Walla Walla subbasin

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Table 2. Average monthly flows for principle tributaries and portions of the mainstem Walla Walla River

Tributary/ Stream Segment	USGS Gage #	General Location	Period of Record	Average Monthly Flows (cfs)											
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mill Cr.	14013000	Near Walla Walla WA	1913-1998	131	155	159	174	140	75	38	31	31	37	73	113
Dry Cr.	14016000	Near Walla Walla WA	1949-1966	37	53	48	46	24	10	2	1	2	4	12	31
EF Touchet R	14016500	Near Dayton WA	1941-1967	135	189	183	218	187	102	54	44	44	51	82	144
Touchet R.	14017000	At Bolles, WA (near Waitsburg)	1924-1988	393	440	433	428	279	140	50	35	44	65	137	268
Touchet R.	14017500	At Touchet, WA (near confluence w/WW River)	1941-1954	329	577	441	475	354	173	54	26	33	60	145	272
Walla Walla R.	14018500	Near Touchet WA	1951-1998	1112	1303	1201	1071	725	252	42	19	40	80	300	812
SF Walla Walla R.	14010000	Near Milton-Freewater OR	1907-1990	175	188	214	280	305	205	124	109	107	111	135	166
NF Walla Walla R.	14011000	Near Milton-Freewater OR	1930-1968	56	66	82	119	96	41	8	4	5	11	27	52

Low flows also have significant impacts in the Walla Walla subbasin. Flows are annually depressed because of natural variability and human water use throughout the subbasin. In a number of areas, water diversions completely dewater reaches of the river and principle tributaries. This has been documented in the lower Touchet River, lower reaches of Mill Creek, and the Walla Walla River near the Oregon-Washington border. Mill Creek, near Walla Walla, has experienced a dramatic increase in the number of zero-flow days since 1950. These dewatered periods were due in large part to upstream diversions (Pacific Groundwater Group 1995). Dewatering generally occurs during the irrigation season (April through November), its duration dependent upon the water year. In wetter years, the season is shorter, whereas in drier years the season is longer (U. S. Army Corps of Engineers 1997).

Water Quality

The quality of water in the Walla Walla subbasin is highest in the upper drainage and generally degrades in lower elevations. Characterizing water quality is difficult since the Walla Walla subbasin includes drainages in both Washington and Oregon. Each state has its own system of surface water quality definitions and management. Therefore, the §303(d) listings have been chosen as the primary source of discussion since they are based on beneficial use criteria and must be approved by the EPA. Temperature is the parameter of primary concern in the Walla Walla drainage, with much of the lower Walla Walla remaining above 20°C (68°F) for most of the summer. Other §303(d) listings include flow, pesticides, pH, nitrates, and fecal coliform bacteria.

Within the state of Washington's system of surface water quality classifications (Table 3), various stream segments are assigned a classification based on the stream's non-anthropogenic characteristics and beneficial uses. Streams that fail to meet the established criteria may be placed on Washington State's §303(d) list. Certain stream segments in the subbasin have designated standards with special conditions. Mill Creek is protected from any discharge of waste from the city of Walla Walla's Waterworks Dam in Oregon (RM 21.6) to the headwaters. The Walla Walla River is safeguarded from point source thermal pollution (>3°C) when natural conditions exceed 20°C from Lowden (Dry Creek at RM 27.2) to the Oregon border. From the mouth to 13th Street Bridge in Walla Walla (RM 6.4), Mill Creek DO concentration must at least be 5.0 mg/L.

Water quality criteria for the state of Oregon are shown in Table 4. Streams or stream segments that fail to meet or exceed these criteria are identified as impaired for beneficial use and are listed on the state's §303(d) list. The §303(d) listed streams for both Oregon and Washington are shown in Table 5.

Table 3. Surface water classification for Washington[1] stream segments (Washington Department of Ecology 1998).

Washington Surface Water Class	Temperature (°C)	Turbidity[2] (NTU)	Fecal Coliform (#/100mL geometric mean	Dissolved Oxygen (mg/L)	Total Dissolved Gas (% saturation)	PH	Uses	Walla Walla Reach Description
Class AA (Extra-ordinary)	<16	5/10%	<50; 10%>100	>9.5	<110	6.5-8.5	Water supply (domestic, industrial, agricultural), stock watering, fish and shell-fish, wildlife habitat, recreation, commerce and navigation	• Mill Creek from Waterworks Dam (RM21.6) to head-waters Touchet River, North Fork from Dayton water intake to headwaters (RM3.0)
Class A (Excellent)	<18	5/10%	<100; 10% <200	>8.0				• Mill Creek from 13th Street Bridge in Walla Walla (RM6.4) to Walla Walla Waterworks Dam (RM11.5) • Walla Walla River from Lowden (Dry Creek at RM27.2) to Oregon border (RM40)
Class B (Good)	<21	10/20%	<200; 10% <400	>6.5	NA	6.5-9.0		• Mill Creek from mouth to 13th Street Bridge in Walla Wall (RM6.4) • Walla Walla River from mouth to Lowden (Dry Creek at RM27.2)
Class C (Fair)	<22			>4.0			Water supply (industrial), fish, recreation (2° contact), commerce, and navigation	

[1]Alternate regulations apply to all parameters if the river or stream naturally exceeds the standard, or if the anthropogenic contribution exceeds a certain limit; see WAC 173-201-045.

[2]The first number is the allowable anthropogenic increase in turbidity if the background value is <50 NTUs and the second number is the percent allowable anthropogenic increase.

Table 4. Oregon water quality standards for the Walla Walla subbasin.

Temperature: The basic absolute criterion is ≤ 64°F (17.8°C). Two exceptions exist: when salmonid spawning, egg incubation, and fry emergence for native fish occur, standards for the specific times of use are ≤ 55°F (12.8°C); and when the waters support bull trout the standards are ≤ 50°F (10.0°C; Boyd et al. 1999). *Dissolved Oxygen (DO)*: For waterbodies providing salmonid spawning during periods from spawning until fry emergence from the gravels, the following criteria apply: DO shall not be less than 11.0 mg/l, but if the minimum intergravel DO measured as a spatial median is 8.0 mg/l or greater, then the DO criterion is 9.0 mg/l. Where conditions of barometric pressure, altitude, and temperature preclude attainment of the 11.0 mg/l or 9.0 mg/l criteria, DO levels shall not be less than 95% of saturation. For waterbodies identified by the Oregon Department of Environmental Quality (ODEQ) as providing cold-water aquatic life, the DO shall not be less than 8.0 mg/l as an absolute minimum. The DO level for cool-water aquatic life shall not be less than 6.5 mg/l. The minimum DO level for warm-water aquatic life is 5.5 mg/l. *Turbidity (Nephelometric Turbidity Units, NTU):* No more than a 10% cumulative increase in natural stream turbidities are allowed, as measured relative to a control point immediately upstream of the turbidity causing activity. In special situations (construction, emergencies) the NTU limit can be exceeded provided turbidity control techniques have been implemented and affected agencies have given authorization. *pH (hydrogen ion concentration)*: pH shall not fall outside the range of 6.5 to 9.0. The ODEQ will determine if any pH values higher than 8.7 are anthropogenic or natural in origin. Where it is proven that waters impounded by dams existing on January 1, 1996 would not have a pH exceedance if the impoundment were removed, exceptions will be made. *Bacteria standard:* A 30-day log mean of 126 *E. coli* organisms per 100 ml based on a minimum of five samples; or no single sample shall exceed 406 *E. coli* organisms per 100 ml.

Table 5. §303(d) listed streams in the Walla Walla River subbasin.

River or Stream	St.	§303(d) Parameter	Criteria
Mill Ck.	OR	Temperature	10˚C (50˚F) Bull Trout
Mill Ck.	WA	Flow	Zero flow days
		pH	<8.5
		Temperature	unavailable
Touchet	WA	Temperature	unavailable
Touchet	WA	Temperature	unavailable
		Fecal Coliform	unavailable
SF Walla Walla	OR	Temperature	17.8˚C (64˚F)
NF Walla Walla	OR	Temperature	10˚C (50˚F) Bull Trout
		Flow	Salmon and Steelhead Plan (1990)
Walla Walla mainstem	WA	Flow	Zero flow days
Walla Walla mainstem	WA	Temperature	unavailable
		pH	unavailable
		Fecal Coliform	unavailable
Walla Walla mainstem	WA	Pesticides	Exceeds NTR criteria
Walla Walla mainstem	WA	Pesticides	Exceeds NTR criteria

Temperature

Most watershed reports describe high seasonal water temperatures as a problem in the Walla Walla subbasin, with nine segments on the §303(d) list for temperature. When reviewing the §303(d) listed streams for temperature it should be noted that some waterways were listed (especially in Oregon) because of the comparatively low bull trout temperature requirement of 10ºC (50ºF) as the criteria judgment. This standard is based on a seven-day moving average of daily maximum temperatures.

Water temperatures in the Walla Walla subbasin show a seasonal pattern, with warming beginning in April. Temperatures reach above 20˚C in the lower subbasin by June, about 20ºC in most of the subbasin in July and August, and then begin to cool through September and October. Average temperatures throughout the subbasin are below 5ºC (41ºF) from November through March.

Temperature monitoring conducted by the Walla Walla Basin Watershed Council (WWBWC) in 2000 identified multiple locations in the Walla Walla subbasin where temperatures exceeded state criteria. The Walla Walla River downstream of the mouth of the Touchet River exceeded standards three times for temperature (Mendel et al. 2000).

The Umatilla National Forest monitors stream temperatures at the Forest boundary in both Washington and Oregon. The annual seven-day maximum stream temperature for the North Fork Touchet River varies between 54 and 59ºF, Mill Creek between 55 and 60, the North Fork Walla Walla River between 63 and 65, and the South Fork Walla Walla River between 53 and 55.

Pesticides

The Walla Walla River has been listed on the WDE's 1998 §303(d) list for eight pesticide violations on two segments of the lower Walla Walla mainstem below the confluence with the Touchet River. Violations include heptachlor epoxide, chlordane, dieldrin, DDE, DDT, hexachlorobenzene, and PCB-1260. Fish tissue samples from the Walla Walla River in 1992 and 1993 contained one or more pesticide compounds in concentrations above the National Toxic Rule (NTR) criteria and qualified the reach for addition to the §303(d) list (Davis et al. 1995). Most organochlorine compounds detected in fish tissue are banned or no longer used (Davis et al. 1995); therefore, concentrations of these compounds should decease in future analyses.

Tissue samples from carp in the Walla Walla River contained 722 μg/Kg of total DDT (Davis et al. 1995); moreover, relatively high concentrations of DDT and its breakdown products were found in all whole-fish sucker and carp. While total concentration of DDT in fish tissue seems to have remained fairly constant, the percentage of DDT compared to its breakdown products DDE and DDE has decreased from an average of 17% in 1984 to 11% in 1989 to 5% in 1993. This indicates that DDT and its metabolites are still active in the Walla Walla River due to their persistent nature in the environment, but that there are no new sources (Davis et al. 1995).

Total PCB measurements of 383 μg/Kg exceeded the screening value of 1.4μg/Kg. Samples also contained high levels of chlordane, dieldrin, heptachlor epoxide, and hexachlorobenzene. Screening values and NTR criteria were exceeded for all these compounds in the carp fillets. Total DDT, DDE, and PCBs in the whole fish samples exceeded recommended wildlife criteria. Concentrations in steelhead fillets were lower, but total DDT, dieldrin, and heptachlor epoxide still exceeded screening values and NTR criteria (Davis et al. 1995). These results were consistent with fish sampling studies conducted in 1984 and 1989 for DDT and its metabolites. It was not possible to compare the 1992 and 1993 study results for other compounds with the studies in the 1980s because of the high detection limits used in the 1980s.

Flow

The mainstem, North Fork, and Mill Creek are listed as low flow §303(d) listed streams. Water diverted for irrigation and other agricultural practices are the primary sources of diversions. Aquatic habitats cannot be maintained without adequate water. Low flow rates also cause higher temperatures and may adversely affect other water quality parameters. Zero flow days were recorded for the Walla Walla from June to November and 140 zero flow days were recorded for Mill Creek in 1992 (Washington Department of Ecology 1999).

Fecal Coliform Bacteria

Segments of the Walla Walla and Touchet Rivers were listed on the WDE 1998 §303(d) list for fecal coliform. Fecal coliform samples collected from the WDE's ambient monitoring station on the Walla Walla River (RM 15.3) documented six excursions out of 35 samples (18%) between the years 1991 through 1996 that were beyond the established state criteria. Fecal coliform samples collected from the WDE's ambient monitoring station on the Touchet River (RM 0.5) documented three excursions out of 12 samples

(25%) between the years 1991 through 1996 that were beyond the established state standards (M. Wainwright, WDE, February 2001).

pH

The Walla Walla River and Mill Creek are also listed on the 1998 §303(d) list for pH. The problem peaks on average in the month of August when the pH limit of 8.5 is exceeded. The Walla Walla River downstream of the mouth of the Touchet River exceeded standards three times for pH (Mendel et al. 2000). Other sites throughout the subbasin had excessively high pH at times during the month of August, but not high enough or consistently enough to be listed as a §303(d) stream.

Dissolved Oxygen

Although none of the streams in the Walla Walla drainage are listed on the §303(d) list for dissolved oxygen (DO), Mendel et al. (2000) found that several streams did not meet state criteria. In 1997, DO ranged from 6.5 to 13.5 mg/L in the Walla Walla River near Touchet, a generally acceptable range for adult and juvenile salmonids (Washington Department of Ecology 1998). In this same stretch of river, percent saturation ranged from ~95% in the winter months to ~120% during the summer. Since the amount of oxygen water can hold decreases as water temperature increases, super-saturated (>100%) waterways mean less oxygen is available for aquatic life.

Total Suspended Solids

Although no reaches of the Walla Walla subbasin are on the §303(d) list for suspended solids or turbidity, the amount of sediment in the river system may be problematic at times. The total suspended solids (TSS) concentration in the Walla Walla River from January to June ranges between 50 and 650 mg/L. The upper limits for continuous exposure by salmonids is 80 parts per million (or 80 mg/L; U. S. Fish and Wildlife Service 1995). This value varies depending on species and life history phase. For example, Servizi and Gordon (1990) determined that the 96-h LC50 for juvenile chinook exposed to suspended sediment was 31 +/-1.5 mg/L (31,000 ppm) at 7°C with 95% confidence. Noggle (1978, cited in Nelson et al. 1991) reported that suspended sediment concentrations of 1,200 mg/L caused direct mortality of underyearling salmonids, while 300 mg/L caused reduced growth and feeding. High levels of suspended solids also indicate soil erosion and damage to spawning habitats.

Ammonia Nitrogen

Average ammonia-nitrogen concentrations in the Walla Walla River between 1991-1997 exceeded the upper limit for optimal health conditions for salmonids of 0.0125 mg/L (U. S. Fish and Wildlife Service 1995) year-round with an average peak of 0.0725 mg/L in the month of March. Direct mortality for salmonids occurs when prolonged ammonia-nitrogen exposure ranges between 0.2 mg/L and 2.0 mg/L (Norris et al. 1991). Ammonia (NH_3) is also a weak base and can contribute to problems with pH.

Vegetation

Historically, timber and brush mixed with grass and forbs were found in the Blue Mountains, bunch grasses in the middle portions of the watershed, and wild rye and sagebrush in the valleys (U. S. War Department 1860; U. S. Department of Agriculture 1941). As part of a governmental railroad survey from the Mississippi River to the Pacific Ocean conducted in 1853, the Touchet River was noted as "separated by a rolling, grassy prairie; its banks better wooded than those of any stream met with west of the Bitter Root mountains, and the soil equal to any which had been seen on the route" (U. S. War Department 1860). Other historical accounts describe a limited amount of vegetative diversity, such as that recorded by historian David Douglas of the London Horticulture Society who traveled up the Walla Walla River in 1826 to collect samples for the Hudson's Bay Company. While near the mouth, he described the country to the north as an "entirely level plain of gravel and sand, destitute of timber, with not even a shrub exceeding four feet in height except a few low straggling birch and willow on the sides of rivulets or springs" (Lavender 1972).

Current vegetative conditions in the Walla Walla River subbasin reflect the land use practices that have occurred in the area throughout its history (U. S. Department of Agriculture 1941). The most significant changes as they relate to surface water, fish, and wildlife have occurred in the last 150 years. The large influx of Euro-Americans to the subbasin began in the mid 1800s. The settlers brought with them large numbers of domestic cattle, sheep, and draft horses (U. S. Department of Agriculture 1941). Ultimately the rangelands were overgrazed, which led to native plant species such as steppe grass vegetation associations being replaced by more competitive and/or introduced plant species (Grable 1974). Dominant species include cheatgrass (*Bromus tectorum*), velvet grass (*Holcus lanatus*), yellow starthistle (*Centaurea solstitialis*), barnyard grass (*Echinochloa crusgual alli*), tansy (*Tanacetum vulgare*), and rattlegrass (*Bromus brizaeformis*).

The earliest noted agriculture in the valley occurred in about 1825 at Fort Nez Perce near the mouth of the Walla Walla River. In 1839 at Whitman Mission, wheat, corn, onions, melons, and various other crops were in cultivation (Farnham 1844). Prior to the establishment of Whitman Mission in 1836, the grass-covered hills were thought to be only suited for grazing, but by 1850 small amounts of cropland were situated along the river bottoms including some irrigation. In the fall of 1863, a farmer sowed 50 acres of wheat on the upland near Weston and the following summer collected an average of 35 bushels to the acre. From this point forward, land was broken out at an accelerated rate and by the late 1870s, Walla Walla County was considered one of the leaders in cultivated grains (U. S. Department of Agriculture 1941).

Today most of the plateau surrounding the Walla Walla River valley from the foothills to the river's mouth is dry-farmed (Figure 7). Remnant strips of grassland steppe vegetation exist throughout the farmed plateau and Walla Walla subbasin. Low-growing shrubs and grasses on the upper slopes and valleys of the plateau and foothills give way to open woodlands and finally dense stands of coniferous forests on the slopes of the Blue Mountains and its foothills. Douglas fir (*Pseudotsuga menziesii*) and grand fir (*Abies grandis*) dominate the higher elevations, while ponderosa pine (*Pinus ponderosa*) dominates the lower elevation Blue Mountains (U. S. Army Corps of Engineers 1997;

Figure 8). Historically, extensive riparian zones existed along streams in the Walla Walla subbasin (U. S. Army Corps of Engineers 1997). Currently, only about 37% of the Touchet River riparian zone is defined as riparian vegetation (Mudd 1975). Along the Oregon portion of the river, 70% of the existing riparian zone is in poor condition (Water Resources Commission 1988, cited in U. S. Army Corps of Engineers 1997).

Land Uses

Land uses in the Walla Walla subbasin are subject to the jurisdiction of five counties and two states, Walla Walla and Columbia Counties in Washington State and Umatilla, Union, and Wallowa Counties in Oregon. Most of the subbasin is privately owned and used for agriculture, 96% of which is in Washington (Figure 8). A variety of other entities also manage land within the Walla Walla Basin (Table 6; Figure 9).

Table 6. Land ownership in the Walla Walla subbasin (U. S. Army Corps of Engineers 1997).

Land Ownership	Square Kilometers	Percent of Subbasin
Private or Other	4,060	90
Federal	427	9
State	25	1

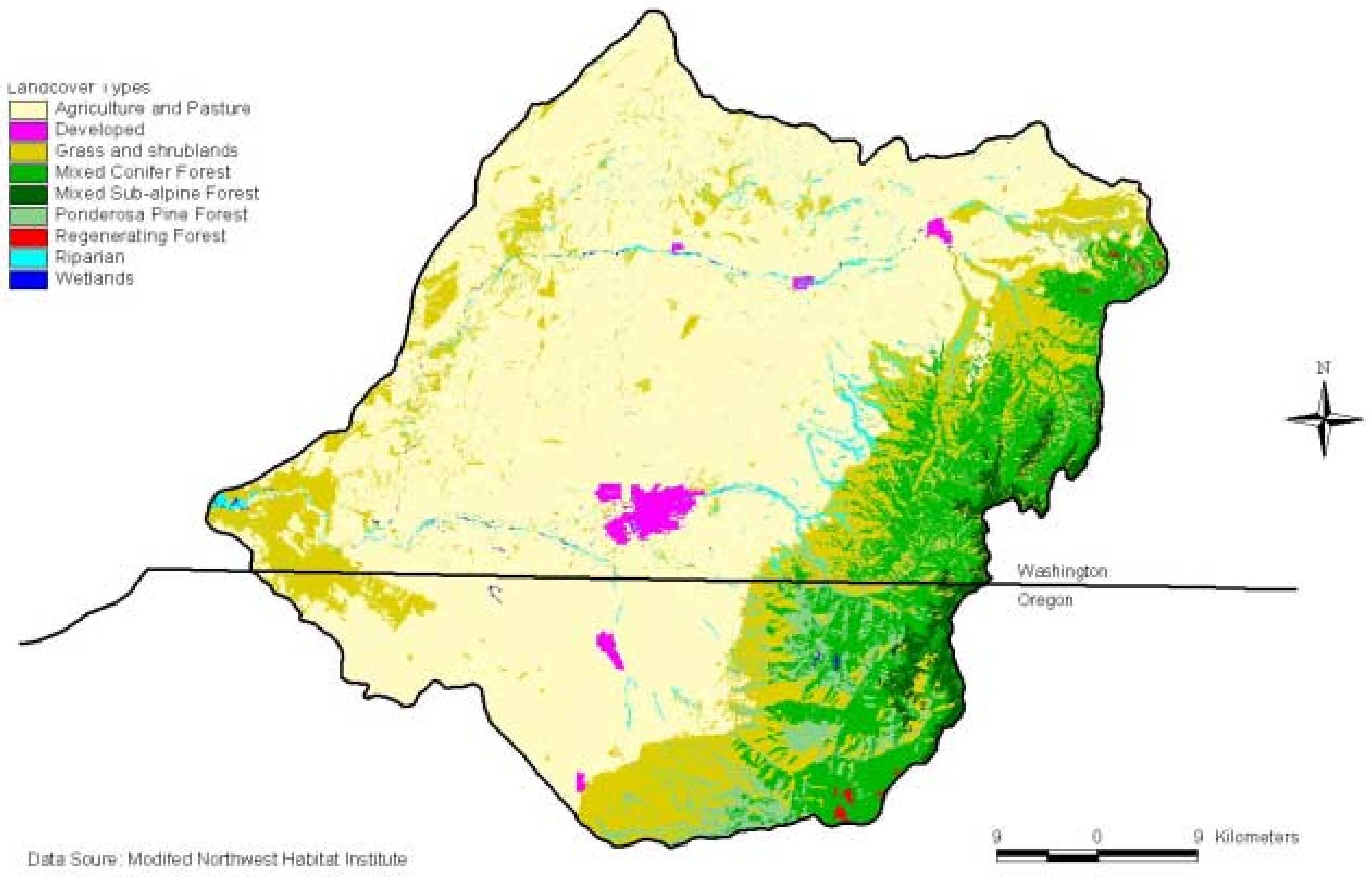


Figure 7. Current land cover in the Walla Walla subbasin.

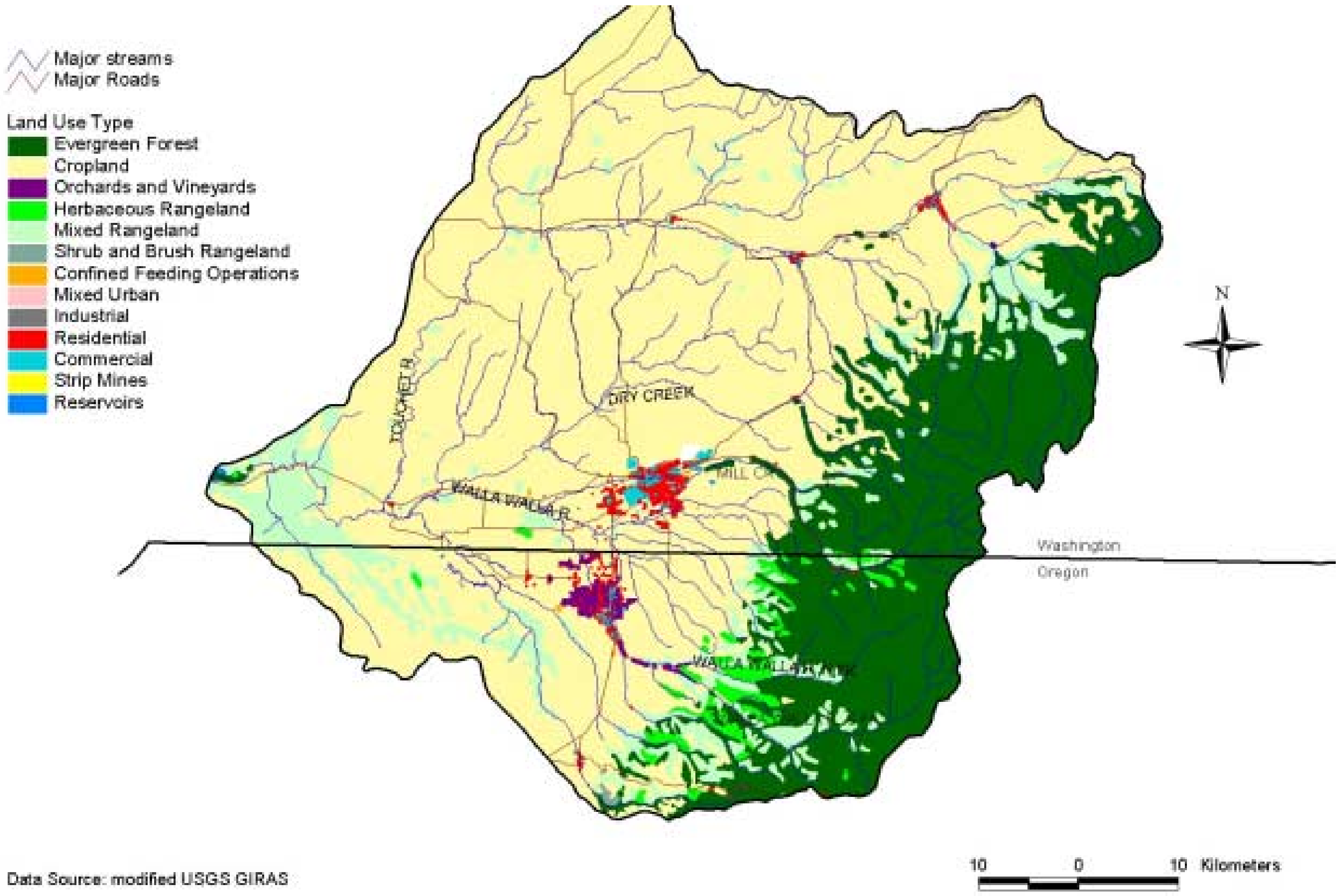


Figure 8. Land use in the Walla Walla subbasin.

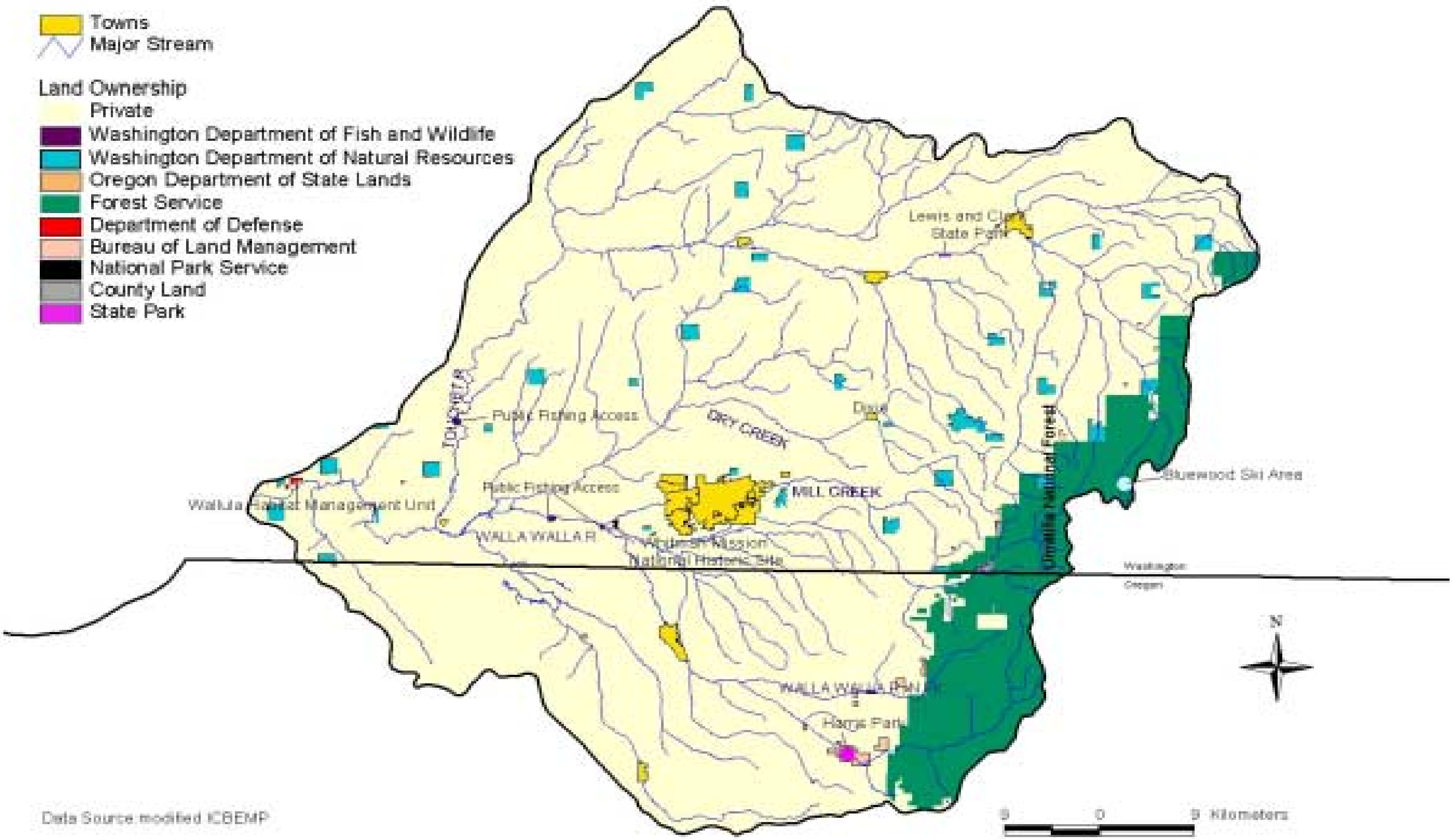


Figure 9. Land ownership patterns in the Walla Walla subbasin.

Federal land management entities include the U. S. Forest Service (Umatilla National Forest) and the U. S. Bureau of Land Management. Table 7 summarizes the areas within the Walla Walla subbasin that are protected and/or are managed using a conservation strategy. All lands managed by the Forest Service (USFS) and Bureau of Land Management (BLM) are located in the Blue Mountains. State management entities in the subbasin include the Washington Department of Fish and Wildlife (WDFW), Oregon Department of Fish and Wildlife (ODFW), Oregon Department of Forestry (ODF), Washington Department of Forestry (WDF), Washington Department of Natural Resources (WDNR), Oregon Department of Environmental Quality (ODEQ), Washington Department of Ecology (WDE), and the Oregon Water Resources Department (OWRD).

Agriculture

The Walla Walla region is one of the most productive agricultural areas in the world. Crop production in the region is mostly influenced by mean annual precipitation, length of growing season, and depth of soil. Three management zones are identified based on precipitation amounts designated as 1) low (14 inches or less), 2) intermediate (14-18 inches), or high (18 inches or more). The cropping systems vary by precipitation zone, with annual cropping dominating in the high precipitation zones and three year rotations of wheat, barley, peas, and fallow being more common in the lower precipitation areas (R. Sherman, WSU Columbia County Extension, 1999).

Grains grown on high dry-farmed land account for about half of the 133,000 acres of crops in the Oregon portion of the Walla Walla subbasin. Green peas take up approximately 17,600 dryland acres spanning from Milton-Freewater to Walla Walla. The 11,800 acres of fruit is mostly grown north of Milton-Freewater (U. S. Bureau of Reclamation 1999).

Table 7. Areas in the Walla Walla subbasin that are protected and/or are managed using a conservation strategy (U. S. Forest Service 1990; Allen Childs, CTUIR, February 2, 2001).

<table>
<tr><th>Site</th><th>Location</th><th>Acreage</th><th>Type of Protection</th><th>Management Objectives</th></tr>
<tr><td>Whitman Mission National Historic Site</td><td>At juncture between Cold Creek and the Walla Walla River</td><td>98</td><td>National Park Service</td><td>Managed for historical preservation; includes native vegetation restoration</td></tr>
<tr><td>Lewis and Clark Trail State Park</td><td>Between Waitsburg and Dayton on the Touchet River</td><td></td><td>Washington State park</td><td>Managed for historical preservation; includes native vegetation restoration</td></tr>
<tr><td>Touchet River Road #64</td><td>Forest boundary to Forest Road #6437 in the upper Touchet watershed</td><td>8,874</td><td>USFS viewshed 1</td><td>• Managed as natural appearing landscape
• Dead and down tree habitat managed for 60% of potential population level for all primary cavity excavators</td></tr>
<tr><td>South Fork Walla Walla Trail #3225</td><td></td><td>13,708</td><td>USFS viewshed 2</td><td rowspan="2">• Fire suppression of mid to high intensity fires
• Down and dead trees managed for 60% of potential population level for all primary cavity excavators
• 90% of potential smolt habitat capability index
• Mixed size and age of trees
• Suppress moderate to high intensity wildfires</td></tr>
<tr><td>Tiger Creek Road #65</td><td>Upper North and South Fork Walla Walla</td><td>8,333</td><td>USFS viewshed 2</td></tr>
<tr><td>Mill Creek municipal watershed</td><td></td><td>21,740</td><td>Municipal watershed</td><td>• Sufficient quantity and quality of water
• No grazing
• Natural vegetative conditions
• Restricted recreation
• No off-highway vehicle use
• No timber harvest of firewood cutting
• Down and dead trees managed for 80% of potential population level for all primary cavity excavators and maintained for other cavity users
• No mining
• No road construction
• Fire suppression and prescribed fire outside of riparian zones allowed</td></tr>
<tr><td>Rainwater Wildlife Area</td><td>Upper South Fork Touchet River subbasin</td><td>8,678</td><td>NPPC Fish & Wildlife Program Wildlife Mitigation Project</td><td>• Protect and enhance watershed resources and mitigate impacts to wildlife resources impacted by hydroelectric development in the Columbia River basin
• Promote and maintain a self-sustaining, functional, and healthy watershed</td></tr>
</table>

Site	*Location*	Acreage	Type of Protection	Management Objectives
				• Protect, restore, and enhance water quality, quantity, and instream fish habitat conditions • Protect, restore, and enhance upland and riparian/floodplain habitat • Control, and where feasible, eradicate noxious/undesirable weed species and encourage restoration of native plant communities • Minimize disturbance and harassment to wildlife resources and provide security habitats during critical seasons
Mill Creek Watershed roadless area #14021	Includes Mill Creek Watershed and adjacent North Burnt Fork watershed in the Touchet	26,700	Roadless Area	• Mill Creek for potable water • Burnt Fork for elk forage, domestic livestock and wood fiber • No access allowed to Mill Creek portion of area
Walla Walla R. roadless area #14022	Includes most of the south and north forks of Walla Walla R.	34,500	Roadless Area	• Harvest timber without using roads • 11 corridors along South Fork Walla Walla allocated to primitive recreation
Walla Walla watershed	All National Forest land within North and South Fork Walla Walla watershed except Target Meadows area on the south edge of the watershed		Management area	• Elk habitat managed to achieve an effectiveness index of no less than 60, including discounts for roads open to motorized vehicles • Manage for big game • Habitat effectiveness index of 60 and cover standards apply to all other areas within unit • Manage for 90% potential smolt habitat index
Wallula Habitat Management Unit			Department of Defense	
South Fork Walla Walla Area of Critical Environmental Concern	3 river miles of the South Fork from Harris Park to the USFS Boundary	1,280	Bureau of Land Management	Managed for protection/preservation of threatened and endangered plant and fish species
Swegle Complex	Mouth of Mill Creek (WA) and adjacent Walla Walla River	120	WDFW/USACE	Fishing access as mitigation Fish and Wildlife habitat mitigation
McDonald Complex	Near McDonald Road, below the mouth of Mill Creek	121	WDFW/USACE	Fishing access as mitigation Fish and Wildlife habitat mitigation
Dodd property	7-8 miles above Touchet, WA	2.4	Perpetual easement	Fishing access as mitigation Fish and Wildlife habitat mitigation

The Walla Walla River valley is extensively and intensively irrigated (Figure 10). Irrigated lands primarily occur in the narrow lowland portions of the subbasin, representing the largest use of surface and groundwater in the subbasin (Figure 11). The proportion of surface water versus groundwater allocated for irrigation currently represents a data gap. A report by the U. S. Bureau of Reclamation (1999) estimated that in Oregon there are about 14,000 acres irrigated from surface flows and shallow wells and about 2,000 acres irrigated from deep wells. An in-depth basin-wide study examining respective volumes of surface and groundwater used for irrigation purposes is warranted.

There has been a steady increase in the acres of irrigated croplands in the Walla Walla subbasin since the mid 1800s. The estimated area of irrigated Walla Walla County land in 1987 was 75,333 acres, compared to 97,136 acres a decade later (National Agricultural Statistics Service 1997, 1999). The vicinities of Touchet, Gardena Farms, Walla Walla, and College Place hold the largest proportions of alfalfa and wheat, the subbasin's dominant irrigated crops. The primary water sources include the Touchet and Walla Walla Rivers, East-West Canal, Gardena Canal, Lowden Canals, gravel aquifers, and the basalt system.

In addition to irrigated grain crops, fruit crops such as orchards and vineyards, represent a growing portion of irrigated agriculture in the subbasin. Irrigated orchard acreage in Walla Walla County for example has increased from 6,910 acres in 1992 to 8,003 acres in 1997 (National Agricultural Statistics Service 1997). Irrigated orchard acreage in Oregon (UmatillaCounty) has essentially remained unchanged between 1992 and 1997 (4,984 acres vs. 4,743 acres respectively). Other irrigated crops include asparagus, beans, onions, pasture, and potatoes (James et al. 1991).

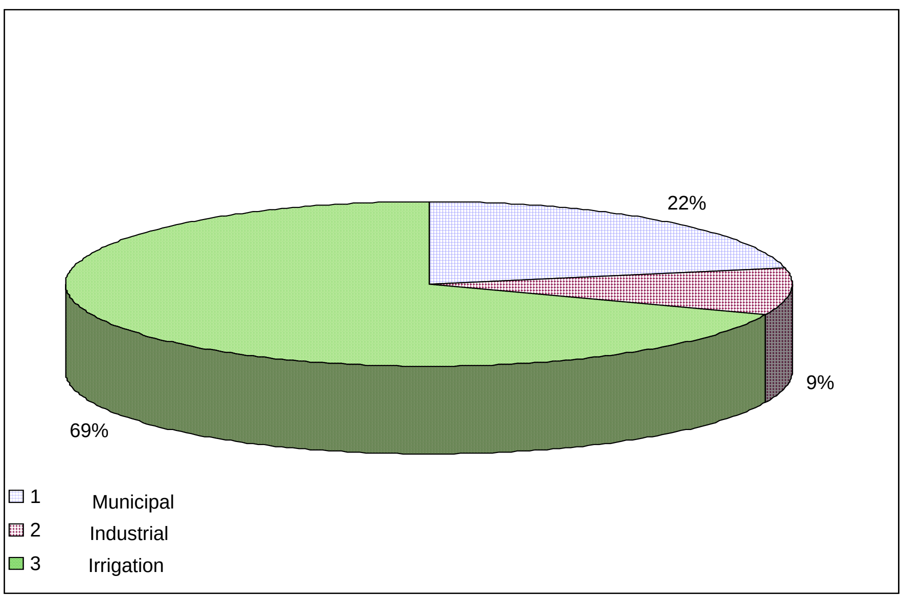


Figure 10. Water use in the Walla Walla subbasin (U. S. Army Corps of Engineers 1997.

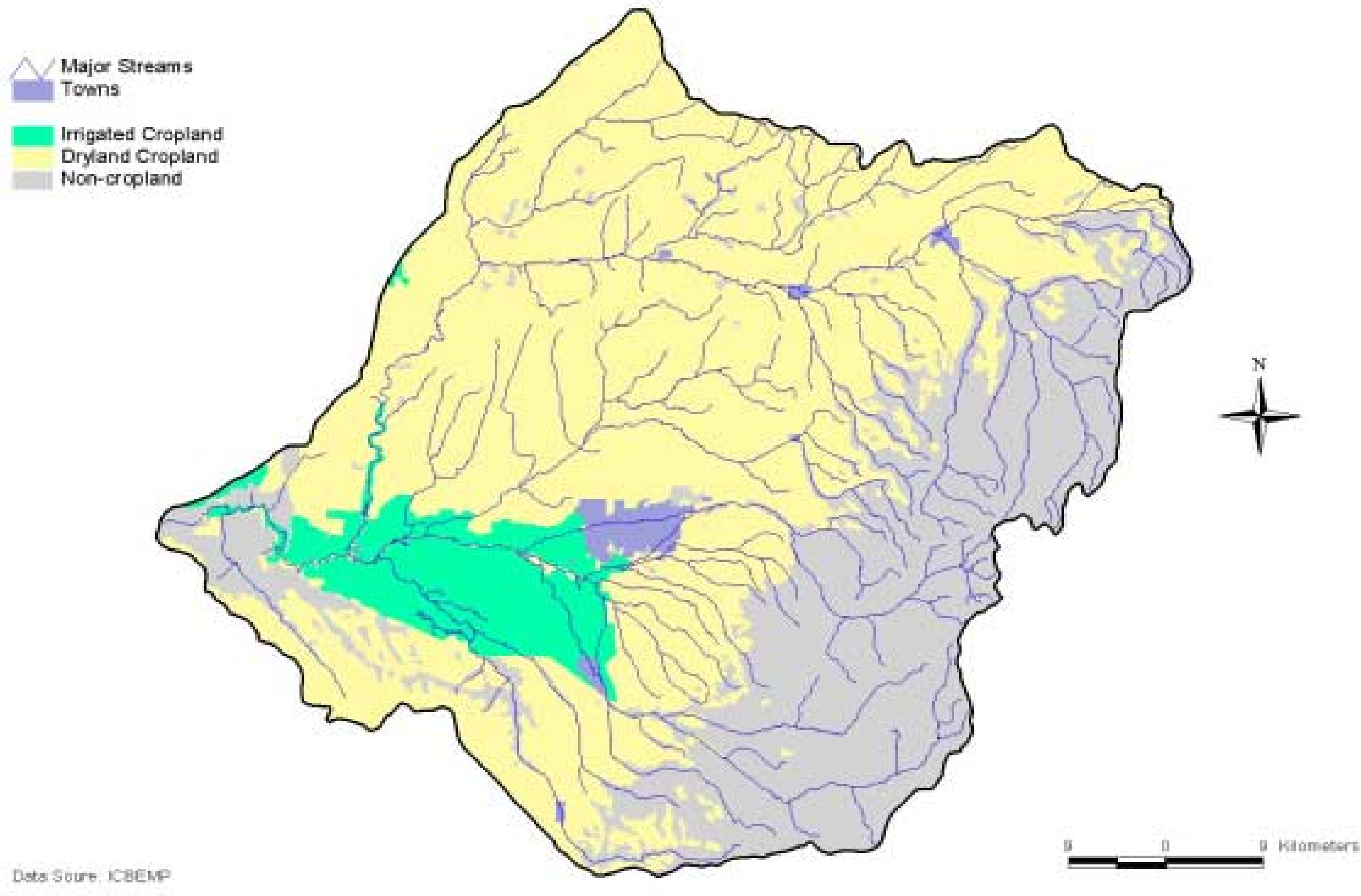


Figure 11. Irrigated and non-irrigated cropland in the Walla Walla subbasin.

The Conservation Reserve Program (CRP) as managed by NRCS assists farmland owners and operators in conserving and improving soil, water, and wildlife resources. Highly erodible and other environmentally sensitive acreage previously devoted to the production of agricultural commodities is converted to long-term approved cover. CRP enhances habitats and forage and reduces sediment delivery. Participants enroll in contracts for 10 to 15 years. Signups have been occurring since the 1985 Farm Bill (Greg Schlenz, NRCS, January 3, 2001).

The CRP has made improvements to 38,211 acres in Columbia County, 148,894 acres in Walla Walla County, and 107,283 acres in Umatilla County from 1986-2001 (U. S. Department of Agriculture 2000). See Table 8 for details.

The majority (62%) of the Touchet subbasin lies within Columbia County. Within the Touchet subbasin, 15,852 (12%) of the 132,097-cropland acres are currently enrolled in CRP (Table 9; Greg Schlenz, NRCS, January 3, 2001).

Table 8. Columbia, Walla Walla, and Umatilla County CRP practices in acreage from 1986-2001 (U. S. Department of Agriculture 2000).

County	***Conservation Reserve Practice***	***Activity Acres***
Columbia	established grass	***9,766.0***
	introduced grasses	***6,225.6***
	native grasses	***14,208.5***
	tree planting	***625.7***
	established trees	***355.0***
	wildlife habitat	***6,210.7***
	wildlife food plots	***19.2***
	grass waterways	***11.7***
	filter strips	***138.2***
	riparian buffers	***650.7***
Walla Walla	established grass	***8,887.1***
	introduced grasses	***52,061.9***
	native grasses	***86,321.5***
	tree planting	***224.6***
	wildlife food plots	***24.0***
	grass waterways	***18.2***
	filter strips	***1,285.9***
	riparian buffers	***71.0***
Umatilla	established grass	***47,536.4***
	introduced grasses	***32,597.3***
	native grasses	***14,076.1***
	tree planting	***853.5***
	established trees	***870.5***
	wildlife habitat	***9,971.9***
	wildlife food plots	***75.2***
	grass waterways	***44.9***
	filter strips	***1,071.3***
	riparian buffers	***185.5***

Table 9. Touchet subbasin CRP activities (Greg Schlenz, NRCS, January 3, 2001).

Date Coming Out of CRP	Acres Coming Out of CRP	Acres Remaining	% CRP Acres of Cropland
Spring 2001	0	15,394.9	12%
9/30/01	1031.5	14,363.4	11%
9/30/02	24.7	14,338.7	11%
9/30/03	0	14,338.7	11%
9/30/04	0	14,338.7	11%
9/30/05	0	14,338.7	11%
9/30/06	1,260.7	13,078	10%
9/30/07	2,608.5	10,469.5	8%
9/30/08	3,389.3	7,080.2	5%
9/30/09	4,401.6	2,678.6	2%
9/30/10	2,678.6	0	0%
Total CRP Acres	15,394.9	0	0%

Timber

The forested lands in the Oregon and Washington portions of the Walla Walla subbasin are shown in Table 10. The majority of timber harvest on federally managed lands occurs in the high-elevation portions of the subbasin, while privately harvested grounds generally occur on mid-elevation lands. Timber harvest off the Umatilla National Forest (UNF) is restricted to the upper North and South Fork Walla Walla, Mill Creek, and upper Touchet River tributaries. Some timber harvest has occurred in the North Fork watershed, but little in the South Fork (U. S. Bureau of Reclamation 1999). The UNF has proposed a “salvage and fire-break” timber sale on the ridge tops dividing the headwaters of the North and South Forks of the Walla Walla River and Mill Creek watersheds (Northrop 1998b; U. S. Bureau of Reclamation 1999). The sale would harvest 4.6 million board feet of timber on 514 acres using a forwarder cut-to-length harvesting system (Northrop 1998b). Although the biological assessment has determined that the sale will not directly affect salmonid production or habitat (Northrop 1998b), there is concern about how the removal of timber and related activities could affect water quality and seasonal flow regime (U. S. Bureau of Reclamation 1999).

Timber harvest on private lands represents a substantial proportion of the ongoing logging operations in the Walla Walla subbasin and is expected to continue in the future as tree stands and market conditions allow. Private contractors such as Boise Cascade continue to operate in the subbasin, albeit at a small scale.

Table 10. Forested portions of the Walla Walla subbasin and respective divisions by management entity.

State	Total Forested Acreage	Federally Managed Land (acres)	State Managed Land (acres)	Privately Managed Land (acres)
Washington	138,651	44,763	6,058	87,831
Oregon	88,200	48,700	1,560	37,900

Range

Livestock grazing predominately occurs in the upper portions of the subbasin, while dairies are southwest of Walla Walla in the Umapine area. The upper portion of the subbasin in Oregon supports about 15% of the Umatilla County's cow-calf operations (about 4,800 pairs; U. S. Bureau of Reclamation 1999). Columbia County contains one large-scale livestock operation; other operations in the Touchet portion are either secondary businesses and/or small (Roland Schirman, WSU Cooperative Extension, April 7, 1999). Because of steep slopes, little gazing occurs on federal lands in the North and South Fork Walla Walla watersheds. A small amount of sheep grazing occurs on the breaks at the upper end of the South Fork Walla Walla watershed (U. S. Bureau of Reclamation 1999).

Urban Development

There are numerous towns located within the Walla Walla subbasin, many of which are incorporated (Table 11). Urban sprawl is a concern for resource managers, as indicated by the growing number of ranchettes, subdivisions, subdivided cropland, and floodplain encroachment. These areas often occur near wooded areas, lakes, or streams. One of the concerns is over the increasing number of shallow individual domestic wells (existing and proposed), which pose a very real and significant deterrent to full utilization of the available water resources in the underlying aquifer (Hanson and Mitchell 1977). Similarly, the increasing number of dwellings poses a threat to water quality due to the increased amount and dispersion of potential nutrient sources immediately adjacent to waterways.

Table 11. Incorporated towns with populations exceeding 1,000 in the Walla Walla subbasin (U. S. Census Bureau 2000).

City	Population						Urban Area (mi^2)
	1990	1992	1994	1996	1998	1999	
Walla Walla, Washington	26,482	28,134	28,730	28,930	29,440	29,200	12.2
College Place, Washington	6,308	6,410	6,710	6,865	7,110	7,395	1.7
Milton-Freewater, Oregon	5,699	5,837	6,002	6,037	6,054	6,093	1.7
Dayton, Washington	2,468	2,470	2,505	2,550	2,553	2,555	1.5
Waitsburg, Washington	990	1,015	1,130	1,224	1,225	1,200	0.8

In the Washington portion of the subbasin, municipal water systems are supplied from both surface and groundwater sources (Hanson and Mitchell 1977). Walla Walla, the largest city in the subbasin, obtains approximately 85% of its water supply from Mill Creek (Hanson and Mitchell 1977). Trends indicate the aquifer underlying Walla Walla and many other urbanized areas is being depleted at an alarmingly high rate (Hanson and Mitchell 1977).

Similar to Washington, Oregon municipalities rely on a combination of surface and groundwater for their water systems. Milton-Freewater, the largest community in the Oregon portion, was estimated in a 1977 study to consume as much as 400,000 gallons of water per day (Hanson and Mitchell 1977).

Transportation

The Burlington Northern and Union Pacific are the two main railroads serving the area. Walla Walla has scheduled air service, along with bus and motor freight. U. S. Highway 12 and Washington State Highway 125 give Walla Walla good highway access. Oregon State Highway 11 provides Milton-Freewater access to the north and south. U. S. Highways 12-395 and 395-730 border the Walla Walla subbasin on the west. Numerous county roads provide access throughout the subbasin. Columbia River water transportation is used for importing agricultural machinery, fertilizers, bulk cement, and petroleum products, and exporting bulk grain, manufactured goods, and processed foods.

Diversions, Impoundments and Irrigation Projects

There are a number of impoundments and diversion structures in the Walla Walla subbasin (Table 12). Of these, Bennington Lake (Mill Creek Project) and Dayton Fish Pond have known fish passage facilities. Mill Creek Project is an off-stream storage facility constructed for flood control.

Table 12. Impoundments in the Walla Walla subbasin (Pacific States Marine Fisheries Commission 2001).

Dam Name	Owner Type	Year Completed	Dam Length	Norm. Storage	Max. Storage (acre-feet)	Long.	Lat.	Fishway Type
Blalock Pond	Private	1917	580	6	13	118.4133	46.053	N/A
Mill Creek (Bennington)	Fed.	1942	3200	3300	8300	118.2617	46.065	ladder
Robison	Private	1954	360	76	200	118.3533	46.103	N/A
Stiller	Private	1962	185	65	90	118.47	46.052	N/A

In the Touchet River, the USBR authorized construction of a multipurpose storage project to provide flood protection and irrigation storage for the cities of Dayton and Waitsburg (Hanson and Mitchell 1977). This and other proposed projects including the Joe West site in Oregon on the North Fork of the Walla Walla and the Blue Creek site at the confluence of Blue Creek and Mill Creek have never been completed.

While irrigated agriculture has helped develop and support the local economic infrastructure in the Walla Walla subbasin over the last several decades, it has reduced the quality of the aquatic ecosystem. The absolute number of diversion points, in addition to the volume of water diverted, has been identified as a primary cause for reductions and extirpations of fish populations in the subbasin (Van Cleve and Ting 1960). Diversions designed to prohibit fish from entering adjoining ditch systems were limited during the early and mid-nineteen hundreds. Nielson (1950) reported a total of 130 points of irrigation diversion in the Walla Walla, 123 of which lacked any form of screen.

Currently, most of the streams and rivers in the Walla Walla subbasin have existing irrigation diversions (Figure 12). To date however, there has not been a comprehensive basin-wide inventory of diversions, which constitutes a noteworthy data gap. The Walla Walla River Basin Cooperative Compliance Review program conducted by the WDFW has attempted to fill this gap by working in conjunction with local landowners who voluntarily submit information relating to their diversion. To date, the program has identified a total of 443 diversions (mostly pumps) and over 300 applicants in Washington (M. Bierley, WDFW, February 15, 2001). However, this value should be considered speculative since gravity diversions are counted multiple times if several people on the same ditch apply for the same diversion (B. Neve, WDE, February 2001).

Other agencies such as WDE have initiated stream diversion inventories using global positioning satellite technology in conjunction with detailed site visits. As of 2001, the program inventoried all diversion points on the mainstem Walla Walla from stateline to McDonald Bridge (B. Neve, WDE, February 2001).

Inventories in the Oregon portion of the Walla Walla estimate there are 280 points of diversion (PODs: pumps and ditches drawing water from streams; Oregon Water Resources Department 2000). The areas where these PODs occur are shown in Appendix A. Many of the gravity-feed ditches in Oregon are screened, but currently do not meet NMFS criteria (Table 13). The only known unscreened gravity diversion in Oregon is the Bowlus #1 Ditch. The number of unscreened pumps in the Oregon portion of the Walla Walla is unknown.

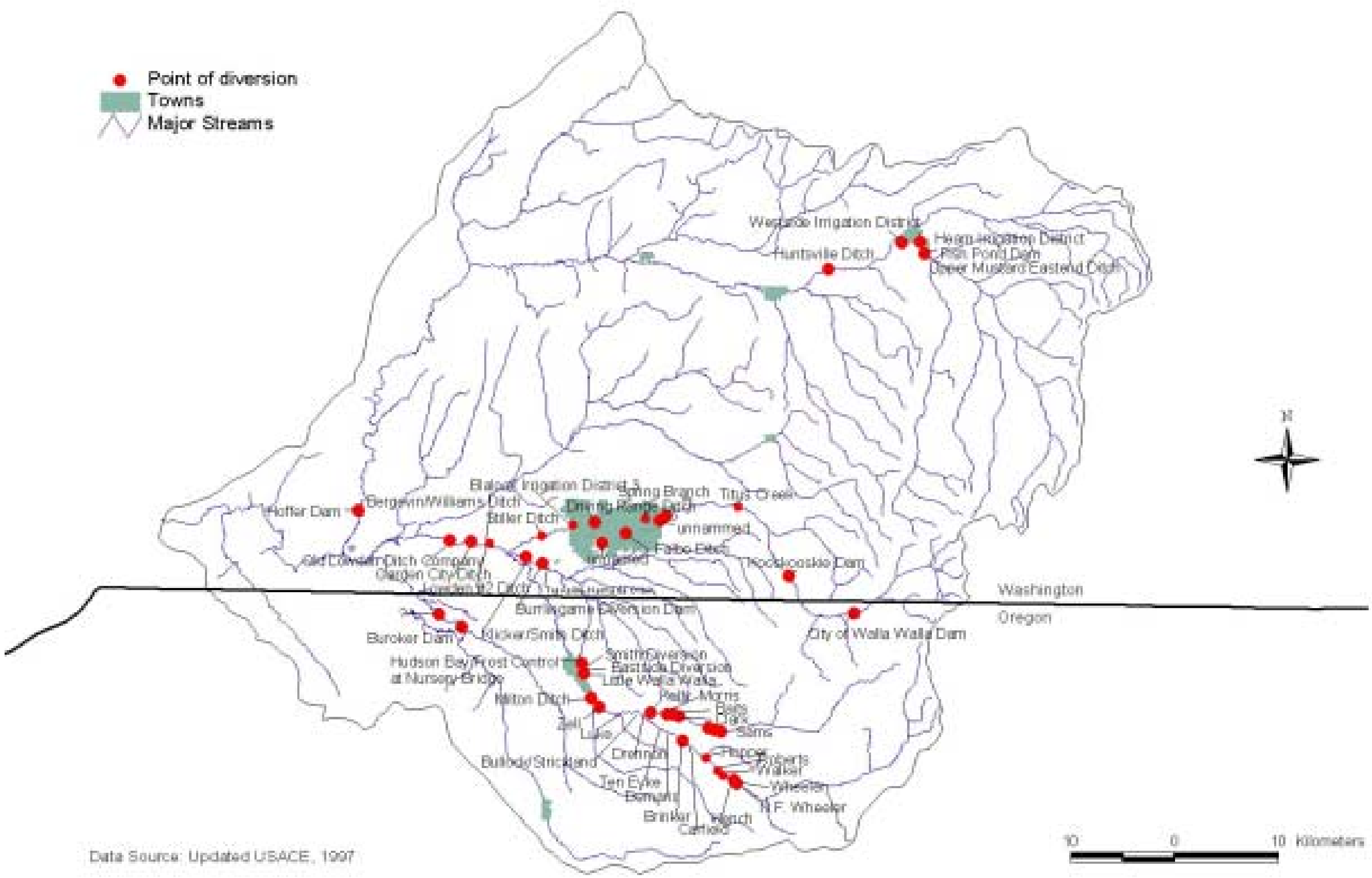


Figure 12. Irrigation diversions and impoundments in the Walla Walla subbasin.

Table 13. Screened gravity-fed ditches in Oregon. Screens are currently not in compliance with NMFS standards (Tim Bailey, ODFW, January 2001).

Waterway	Site	Screening (Y/N)	Notes
Schwartz Creek	**Williams**	**Yes 1999**	
Walla Walla R.	Eastside Ditch	Yes 2000	
Walla Walla R.	Smith Ditch	Yes 1999	Wash. portable no bypass
Walla Walla R.	Milton Ditch	Yes old criteria	Couse Cr.-Fix 2002
Walla Walla R.	Zell Ditch	Yes old criteria	
Walla Walla R.	Spence Ditch	Yes old criteria	
Walla Walla R.	Demaris Ditch	Yes old criteria	
SF Walla Walla R.	Dorothy Ditch	Yes 1998	
SF Walla Walla R.	Hopkins Ditch	Yes 1998	
SF Walla Walla R.	Rhuberg Ditch	Yes 1998	
SF Walla Walla R.	Brinker Ditch	Yes old criteria	
SF Walla Walla R.	Chapman Ditch	Yes 1998	
SF Walla Walla R.	Hopper	Yes 1998	
SF Walla Walla R.	Robinson Ditch	Yes 1998	
SF Walla Walla R.	BPA	Yes 1998	
SF Walla Walla R.	Kentch Ditch	Yes 1998	
SF Walla Walla R.	Roberts Ditch	Yes 1998	
NF Walla Walla R.	NF Wheeler	Yes 1999	
NF Walla Walla R.	Bowlus#1 Ditch	No	Will screen in 2001
NF Walla Walla R.	Kelly Ditch	Yes 1998	
NF Walla Walla R.	Bowlus #2 Ditch	Yes 1998	
NF Walla Walla R.	Obert Ditch	Yes 1998	
NF Walla Walla R.	Albrecht Ditch	Yes 1999	
NF Walla Walla R.	Bowles/Kelly Ditch	Yes 1999	
NF Walla Walla R.	Wallace#2 Ditch	Yes 1999	
NF Walla Walla R.	Wallace#1 Ditch	Yes 1997	Washington portable
NF Walla Walla R.	Bowles Ditch	Yes 1997	Washington portable

Fish and Wildlife Resources

Fish and Wildlife Status

Fish

There are currently more than 30 species of fish inhabiting the Walla Walla subbasin, 17 of which are native (Table 14).

Historically, the aquatic community in the Walla Walla subbasin was probably more diverse and widely distributed than the current situation (Michaelis 1972; Mendel et al. 1999). The historic presence and current absence of natural coho and chinook salmon populations provides a measure of the degree to which the low gradient anadromous habitat has been degraded. Runs of spring and fall chinook, chum, and coho were reportedly present in the Walla Walla River subbasin at one time (Swindell 1942). Fall chinook, chum, and coho were likely present only near the mouth of the river and may have been spillover from large runs in the Columbia River.

The only naturally occurring populations of anadromous fish currently present in the Walla Walla subbasin are summer steelhead (*Oncorhynchus mykiss*; Columbia Basin Fish and Wildlife Authority 1999. Pacific lamprey (*Lampetra tridentata*), a federally listed species of concern and vulnerable listed species in Oregon, may also exist. Summer steelhead (*Oncorhynchus mykiss*) are federally listed as threatened, a candidate for listing in Washington State, and listed as vulnerable in Oregon (Columbia Basin Fish and Wildlife Authority 1999). Native spring chinook (*Oncorhynchus tshawytscha*), which were last documented in the Walla Walla subbasin in the 1950s, are now extinct. However, stray spring chinook have recently been collected by CTUIR in the Washington and Oregon reaches of the Walla Walla subbasin (Mendel et al. 1999; J. Germond, ODFW, 1999).

Non-anadromous salmonids and lamprey endemic to the Walla Walla subbasin include interior redband trout (*Oncorhynchus mykiss*), bull trout (*Salvelinus confluentus*), and mountain whitefish (*Prosopium williamsoni*), and the western brook lamprey (*Lampetra richardsoni*). As of April 20, 2000, redband trout were listed as a sensitive species in Oregon and managed similarly as steelhead when occurring in anadromous waters. Redband are a candidate for listing in Washington State as of June 21, 2000 (based on their similar classification as steelhead). Bull trout are federally listed as threatened under the Endangered Species Act (ESA), candidates for listing in Washington State, and listed as critical in Oregon.

Seasonally high stream temperatures and insufficient streamflows in the mainstem Walla Walla are two of the primary factors contributing to the current status of key fish species (steelhead, spring chinook, bull trout and lamprey). Passage impediments and high sedimentation have also limited aquatic productivity.

Based on temperature standards set by ODEQ, an upper limit of 10°C is established for bull trout, 13°C for all other salmonid species spawning, and 18°C for all other areas, including streams that serve as migration routes for salmonids. Washington temperature criteria for bull trout vary among different assigned classifications, and range from 16 to 22°C (Chapter 173-201 Washington Administrative Code [WAC]). The WDE is revising these standards with the intent of creating temperature criteria that will fully protect

Washington's freshwater aquatic communities. Unsuitable temperatures change migration and maturation timing and leave migrating and spawning fish more susceptible to disease outbreaks, all of which potentially negatively affect survival. Temperature requirements during life history periods for the selected key fish species in the Walla Walla subbasin are shown in Table 15.

Table 14. Fish species present in the Walla Walla River subbasin (G. Mendel, WDFW, December 2000)

Species	Origin[1]	Location[2]	Status[3]	Comments
Bull Trout (Salvelinus confluentus)	N	R, T	C	Headwater areas
Spring Chinook (*Oncorhynchus tshawytscha*)	H	R, T	R	Presumed hatchery strays
Fall Chinook (*Oncorhynchus tshawytscha*)	H	R, T	R	Presumed hatchery strays
Redband Trout/ Summer Steelhead (*Oncorhynchus mykiss*)	N	R, T	C/C	Dayton return range-184-1006; Walla[2] return range – 279-815
Mountain Whitefish (*Prosopium williamsoni*)	N	R, T	R	
Brown Trout (*Salmo trutta*)	E	R, T	R	
Lamprey (Petromyzontidae)	N	R, T	U	brook, river
Longnose Dace (*Rhinichthys cataractae*)	N	R, T	R/I	
Speckled Dace (*Rhinichthys osculus*)	N	R, T	A	
Umatilla Dace (*Rhinichthys umatilla*)	N	R, T	I	
Leopard Dace (*Rhinichthys falcatus*)	N	R, T	I	
Chiselmouth (*Acrocheilus alutaceus*)	N	R, T	C	
Peamouth (*Mylocheilus caurinus*)	N	R, T	I	
Redside shiner (*Richardsonius balteatus*)	N	R, T	C	
Northern pikeminnow (*Ptychocheilus oregonensis*)	N	R, T	C	
Sucker (Catostomidae)	N	R, T	C	Bridgelip, largescale
Carp (*Cyprinus carpio*)	E	R, T	R/I	Common in lower sections of the Walla Walla and Touchet
Bullhead catfish, brown (*Ameiurus nebulosus*)	E	R, T	R/I	Yellow, black
Tadpole madtom (*Notorus gyrinus*)	E	R, T	R/I	
Channel catfish (*Ictalurus natalis*)	E	R, T	C/I	(C) lower mainstem
Smallmouth bass (*Micropterus dolomieu*)	E	R, T	C/I	Common in lower sections of the Walla Walla and Touchet
Largemouth bass (*Micropterus salmoides*)	E	R, T	R/I	
Pumpkinseed (*Lepomis gibbosus*)	E	R, T	I	
Bluegill (*Lepomis macrochirus*)	E	R, T	R/I	
White crappie (*Pomoxis annularis*)	E	R, T	C/I	(C) lower mainstem
Black crappie (*Pomoxis nigromaculatus*)	E	R, T	C/I	(C) lower mainstem
Warmouth (*Lepomis gulosus*)	E	R, T	I	
Yellow Perch (*Perca flavescens*)	E	R, T	I	
Paiute sculpin (*Cottus beldingi*)	N	R, T	C	
Margin sculpin (*Cottus marginatus*)	N	R, T	C	
Torrent sculpin (*Cottus rhotheus*)	N	R, T	R	
3-spine stickleback (*Gasterosteus anculeatus*)	E	R, T	R/I	
Sandroller (*Percopsis transmontana*)	N	R, T	I	

[1]Origin: N=Native stock, E=exotic, H=Hatchery reintroduction
[2]Location: R=mainstem rivers and Mill Creek, T=tributaries, P=ponds
[3]Fish species abundance based on average number of fish per 100m^2: A=abundant, C=common R=rare, U=uncommon, and I=insufficient data

Table 15. Upper temperature (°C) limits for life history periods of key fish species in the Walla Walla subbasin (Hicks et al. 1999; Mallatt 1983).

Life History Period	Steelhead	Spring Chinook Salmon	Bull Trout	Lamprey
Adult migration	< 21.5	< 22.5	< 22.0	< 20.0
Spawning	< 18.5	< 18.5	< 10.0	< 20.0
Embryonic development/ emergence	< 18.5	5.0–11.0	< 5.0	-
Juvenile rearing	< 21.0	< 21.5	< 13.0	< 20.0
Juvenile migration	< 21.0	< 21.5	< 14.5	-

Insufficient streamflows may impact the lifecycle of key salmonid species in many portions of the subbasin. For example, in lower portions of the Walla Walla, Mill Creek, Dry Creek, and the Touchet River, streamflows may limit the accessibility of higher quality upstream habitat. This problem has been documented for bull trout, which occasionally become stranded on their migration upstream from wintering areas in the lower watershed (Mendel 1981). Personnel from CTUIR and ODFW capture and relocate fish trapped in the plunge pool downstream of the Nursery Street Bridge diversion and for a mile or more downstream when flows subside. Results from the 1990–1995 period show that hundreds to thousands of redband trout/steelhead and 10–30 bull trout ranging between 75 and 430 mm in length were salvaged (Buchanan et al. 1997).

Depths of at least 9.5 inches for chinook salmon and seven inches for steelhead at velocities less than 8 ft/s are necessary for upstream passage. Using linear regression of USGS gauge data and species requirements, Hunter and Cropp (1975) determined that a minimum flow of 80 cubic feet per second (cfs), as measured at Bolles, Washington, is necessary for anadromous fish passage in the Touchet River. Average streamflow in the Touchet River at Bolles was around 50 cfs from July through October from 1978–1989. Flows of 75 cfs are necessary for upstream migration on the mainstem Walla Walla River independent of structures (U. S. Fish and Wildlife Service 1983, cited in Ebasco Services and S. P. Cramer and Associates 1992). Based on adult and juvenile passage observations of hatchery fish in the Umatilla River, it was estimated that spring chinook need 14 days a minimum of 150 cfs to allow passage of adults from the mouth of the Walla Walla River to either Hofer Dam or Burlingame Dam; juvenile spring chinook require five days (from time of release) at 150 cfs to allow for outmigration (Zimmerman 1993).

Steelhead

Indigenous summer steelhead persist throughout much of the subbasin and are generally ubiquitous where suitable salmonid habitat is found (Figure 13). The species is included in the Middle Columbia River evolutionary significant unit, making it a distinct population under the ESA (Busby et al. 1996). However, their abundance and relative distribution are considerably reduced from historic levels (e.g., Chapman 1981). Historically, the annual run size in the Walla Walla subbasin was estimated between 4,000–5,000 adults (Confederated Tribes of the Umatilla Indian Reservation 1990; Grettenberger 1992).

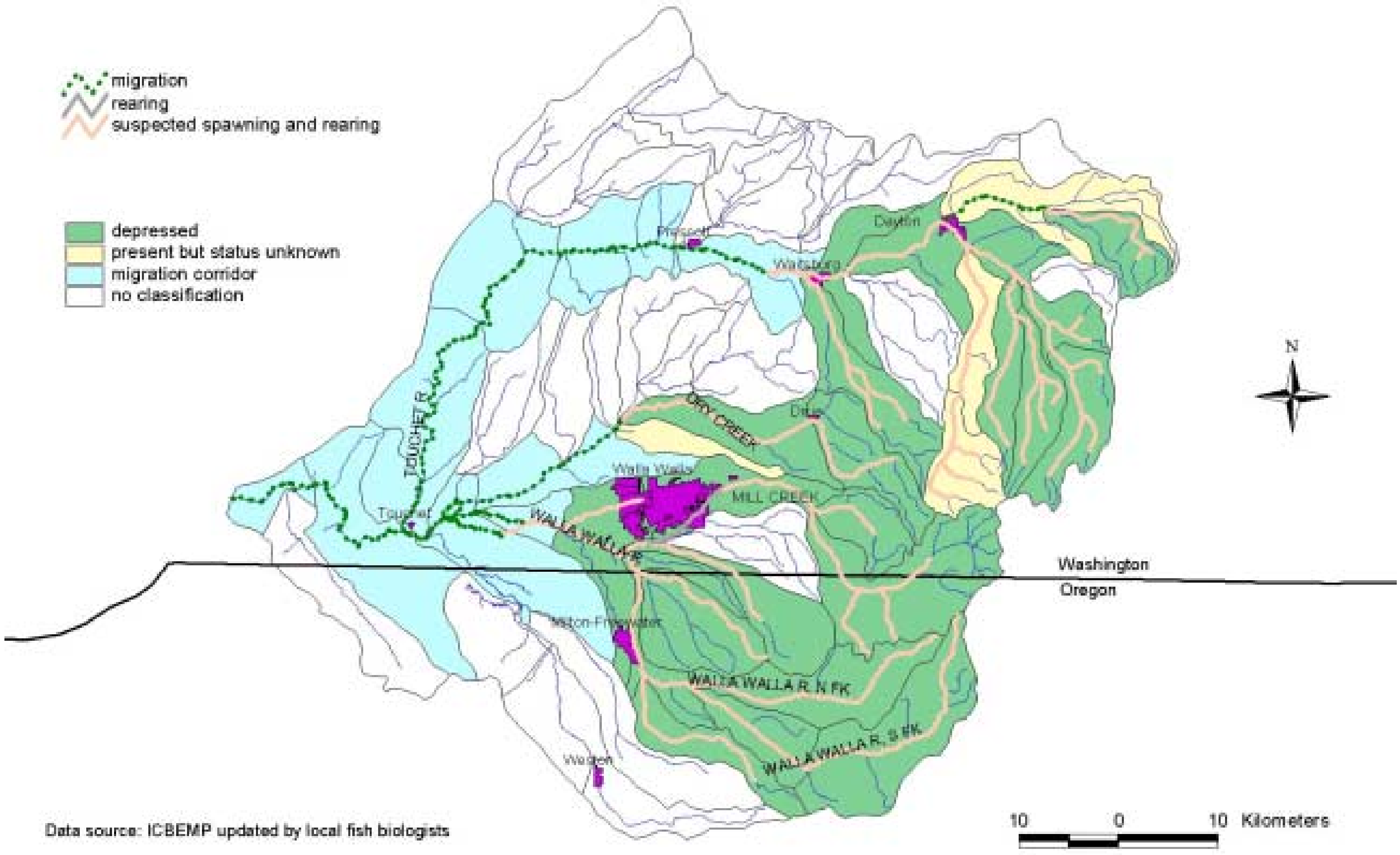


Figure 13. Steelhead spawning, rearing, and relative status in the Walla Walla subbasin.

Native steelhead are currently considered depressed in the Walla Walla subbasin (Washington Department of Fish and Wildlife 1993; Quigley and Arbelbide 1997b). ODFW believes the stock remains resilient and capable of reestablishment with limited or no hatchery intervention (Tim Bailey, ODFW, January 2001). CTUIR believes that with the natural population experiencing a declining trend (currently at about 15% of previously estimated levels) and a closed fishery, hatchery supplementation and habitat actions will be necessary to achieve natural production and harvest objectives. The depressed status of native Walla Walla steelhead may be attributed to a variety of factors, but most notably from habitat loss, insufficient water quantity, and poor water quality (specifically, stream temperatures in many areas). Their reduced abundance and distribution is also reflective of out-of-basin pressures such as ocean conditions and migration losses at hydropower facilities.

Walla Walla summer steelhead spawning migration is largely dependent upon flows, and can occur as early as September or October and extend through June (Confederated Tribes of the Umatilla Indian Reservation 1990; Tim Bailey, ODFW, January 2001). Walla Walla steelhead typically return to the Oregon portion of the subbasin after two years of ocean residence, unlike other Columbia and Snake River populations which generally return as 1 salt adults (Table 16). The return of repeat spawners in the mid-Columbia is not common, but in the Walla Walla represent a significant portion of the return (3.5 to 9.1%) as determined from scale analysis (Table 16). Some biologists theorize that a high proportion of repeat spawners may never return to saltwater, but rather stay and recondition in the Walla Walla subbasin (or Lake Wallula behind McNary Dam).

Spawning initiates in February and extends through early June, with the peak of natural spawning in April and early May. Spawning locations are generally distributed throughout the middle upper mainstem reaches or in high-order tributaries such as the North or South Fork Walla Walla River or North Fork Touchet (G. Mendel, WDFW, 1999). Incubation of embryos and residence of sac-fry in the substrate may extend through June or July prior to emergence.

Table 16. Analysis of scales collected from adult summer steelhead trapped at Nursery Bridge Dam on the Walla Walla River (Oregon Department of Fish and Wildlife data).

Life History Pattern	Percent		
	1992-1993	1993-1994	1994-1995
2/1	24.0	21.0	13.6
2/2	63.0	56.0	63.6
2/3	2.6	0.1	3.0
3/1	2.6	6.9	9.1
3/2	7.8	14.0	10.6
2/4	0.0	2.0	0.0
1 salt	26.0	27.8	22.7
2 salt	71.0	68.7	74.2
3 salt	3.0	1.7	3.0
4 salt	0.0	1.7	0.0
Repeat Spawners	8.0	3.5	9.1

Juvenile steelhead distribution during the summer in the Walla Walla subbasin is shown in Figure 13. Steelhead are generally restricted to the mainstem of the Walla Walla above Milton-Freewater, and rear in associated tributaries including the North and South Forks Walla Walla River, Couse, Mill, lower Pine, Cottonwood, and Dry Creeks (Figure 13). In the Touchet subwatershed, steelhead are distributed in the mainstem between Dayton and Waitsburg, Coppei Creek, Patit Creek, and the North, South, Wolf, and Robinson Forks and their tributaries. Mendel et al. (1999) found an increase in salmonid density with an increase in river mile (RM) on the mainstem Touchet River, a relationship that was considered to reflect the differences in stream temperature. A study by Michaelis (1972) showed that the Robinson Fork supported the highest densities of rainbow trout of all Touchet tributaries surveyed. However, the same study found the growth rate in the Robinson Fork was the lowest of all tributaries measured—a difference presumably attributable to density dependant factors affecting rearing. Tribal surveys conducted in August 1999, determined steelhead rainbow population density in the upper South Fork Touchet to be 0.32 fish/square meter (3200 fish per meter), with an expanded estimate of 12,000 juvenile steelhead in the 6.2 miles of river surveyed. In the Griffin Fork, there were 0.39 fish/meter with an estimated expanded population estimate of 3,400 *O. mykiss* occurring in the 3.1 miles surveyed. In both reaches, the ratio of salmonids to non-salmonids was 4:1.

The lower mainstem Walla Walla and Touchet Rivers below Waitsburg serve primarily as migratory corridors for anadromous steelhead. Electrofishing and snorkel surveys conducted in 1998 (mid-June to mid-September) by the WDFW documented the absence of yearling or older rainbow trout/steelhead in the Touchet River downstream of Waitsburg (RM 58; Mendel et al. 1999). Reduced flows and elevated stream temperatures are common in this portion of the river, and typically result from irrigation withdrawals during summer months (refer to Limiting Factors section). Excessive sedimentation is also common throughout the reach, which may further explain the absence of fish during the survey period.

Steelhead escapement records for the Oregon portion of the upper mainstem Walla Walla subbasin have been collected at the Nursery Bridge fish ladder and trap since 1992. As shown in
Table 17, the number of adult steelhead returning to the subbasin has declined through the nineties, but significantly improved in the 1999-2000 run year, when all Columbia River returns were up. The fish trap allows managers to count most of the fish moving through the system as well as prohibit most non-endemic strays from entering into the population of wild Oregon steelhead (U. S. Army Corps. of Engineers 1997).

Table 17. Adult steelhead counts and escapement estimates for the Oregon portion of the Walla Walla River upstream of the Nursery Bridge Trap (Oregon Department of Fish and Wildlife 2001).

Run Year	Steelhead Counts				Estimated Escapement		
	Natural	Hatchery	Total	% Hatchery	Natural	Hatchery	Total
1992-1993	722	17	739	2.3	815	2	817
1993-1994	423	2	425	0.5	535	1	536
1994-1995	340	19	359	5.3	430	5	435
1995-1996	257	15	273	5.5	358	7	365
1996-1997	231	18	249	7.2	292	5	297
1997-1998	302	12	314	3.8	378	3	381
1998-1999	224	5	229	2.2	279	1	280
1999-2000	410	12	422	2.8	514	13	527

It is important to note that the trap counts in Table 17 do not reflect actual escapement into the Oregon portion of the subbasin. This is due to the fact that steelhead are able to jump over Nursery Bridge Dam and bypass the collection trap in the left bank fishway at some flows. Therefore, to provide an estimate of escapement, trapped steelhead have been marked with a punch either on the opercle or caudal fin. In some years, depending on conditions, kelts have been collected in the headworks of the Little Walla Walla Diversion or at the Nursery Bridge trap. Escapement estimates are based on the ratio of marked versus unmarked kelts. Mark recapture data have only been used in years when the number of kelt recoveries exceeded 5% of the trap count. Several years have had insufficient kelt recoveries. For these years, the escapement estimate is based on an average of data from years with sufficient recoveries. Of those recovered, unmarked kelts have ranged from 10 to 30% since 1992.

A dam and trap located at the steelhead acclimation pond in Dayton, Washington provides additional steelhead count and origin information for fish escaping to the upper Touchet. However, the trap is only able to subsample a small portion of the returning fish. Escapement estimates are made by expanding redd counts from index surveys and assigned the relative percentage of wild and hatchery fish from counts at the trap in a given year (e.g., if 60% of the total number of fish counted at the trap were wild, then it is estimated that 60% of the redds counted during the run year were made by wild fish).

Steelhead harvest in Washington during the past 15 years has resulted from hatchery releases of Wells stock and/or Lyons Ferry stock and from instigation of wild steelhead release harvest regulations. Figure 14 shows the trend in fish harvested following these management activities. The Oregon portion of the subbasin has been closed to angling for steelhead since 1995. Prior to 1995, the mainstem of the Walla Walla was open from the state line up to the confluence of the North and South Forks. From the mid-eighties to the early nineties the harvest in Oregon was at levels comparable to the total run size since that time. The season was open from December 1 through March 31 and the bag limit varied over the years from one fish/day – ten/year, to ten fish/day –

ten/year, and finally two fish/day – 40/year. Harvest of steelhead in Oregon is shown in Figure 15

To determine the genetic stock structure of *Oncorhynchus mykiss* in the Walla Walla River subbasin, CTUIR and WDFW crews collected 695 whole body samples and 401 fin clips from juvenile *O. mykiss*. Samples were collected from 104 sites in nine geographic areas within the Walla Walla subbasin. Two tributary areas were sampled in both 1999 and 2000 to examine between year variations from the same geographic area. CTUIR also aged each fish to determine brood-year for additional examination of between year variations. Collection of juvenile whole body samples began in 1999 and was completed in 2000. CTUIR placed whole body samples in Whirl-Packs and froze them at the time of collection with liquid nitrogen and stored them on dry ice until placed in CRITFC's freezer for long term storage. Additional fin clip samples were collected in 2000. ODFW and WDFW also collected several hundred fin clips from adult steelhead captured at traps and kelts since 1996.

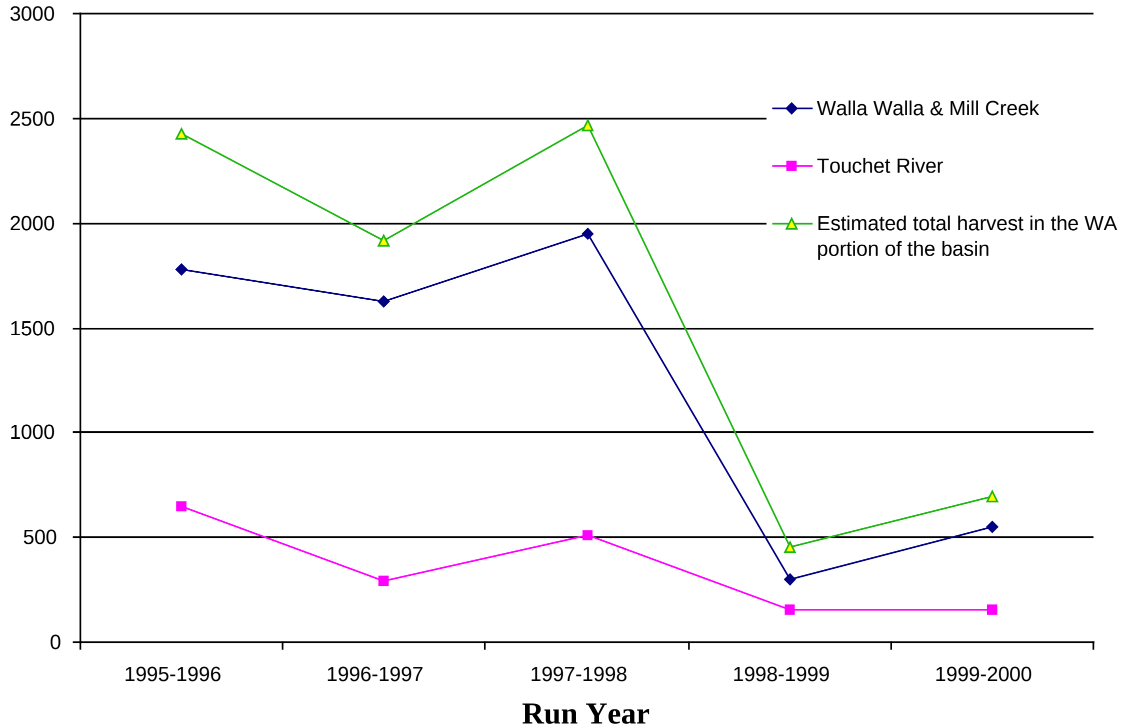


Figure 14. Estimated steelhead harvest in the Washington portion of the Walla Walla subbasin for the run years 1995-2000 (Washington Department of Fish and Wildlife 2001).

Figure 15. Harvest of summer steelhead in the Oregon portions of the Walla Walla subbasin for the run years 1983–2001. Harvest estimates are derived from harvest cards (Oregon Department of Fish and Wildlife 2001).

Table 18. Steelhead escapement estimates for the Touchet River upstream of the Dayton Acclimation Dam trap site (G. Mendel WDFW, February 2001).

Year	Natural	Hatchery	Total	% Natural
1987	334	29	363	92
1988	1006	88	1094	92
1989	214	19	233	92
1990	332	29	361	92
1991	193	17	210	92
1992	374	32	406	92
1993	484	36	520	93
1994	358	19	377	95
1995	388	96	484	80
1996	no information			
1997	no information			
1998	385	43	428	90
1999	184	27	211	87
2000	202	18	220	92

Genetic samples are in the process of being examined by three separate methods including two molecular DNA techniques and the traditional allozyme analysis. WDFW's lab in Olympia, Washington will conduct the allozyme analysis using whole body samples and standard techniques. Allozyme data will be compared with the historic allozyme data collected from *O. mykiss* from throughout the mid- Columbia Basin over the last three decades. The University of Idaho Genetics Laboratory in Hagerman, ID, using the two methods outlined below, will conduct the newer DNA techniques.

Nuclear DNA will be extracted from each sample using standard techniques. Nucleotide primers specific for microsatellite loci will be used to amplify the DNA using the polymerase chain reaction (PCR). Amplified fragment sizes will be determined using a Perkin-Elmer ABI 310 automated fragment analyzer. A minimum of five polymorphic microsatellite loci will be used. Standard population genetic parameters (heterozygosity, "F" statistics, N_m, etc.) will be calculated for each population using programs specific for this task (Genetic Data Analysis, Arlequin, Biosys-I). These data are then used to compare genetic similarities and differences among the locations and test for statistical significance.

Mitochondrial DNA extracted from each individual will also be amplified using PCR. The NADH dehydrogenase subunit 2-gene region has been previously used to estimate genetic diversity and divergence among maternal lineages of *Oncorhynchus spp*. Amplified DNA is digested with restriction enzymes, which provide restriction fragment length polymorphisms (RFLPs). The RFLP data will be analyzed using the Restriction Enzyme Analysis Package (REAP) to provide genetic distance values and test for geographic heterogeneity among the distribution of mitochondrial haplotype frequencies. These data will be used to construct a representation of inferred relationships among observed mitochondrial haplotypes (maternal lineages) and among sample locations using Phylogenetic Inference Package (PHYLIP) and the Numerical Taxonomy and Multivariate Analysis System (NTSYS-pc).

Genetic identities provided by these techniques will be analyzed to address 1) general stock structure within each location and brood year, 2) genetic diversity and divergence within each location and among locations and brood years, and 3) gene flow among locations.

Spring Chinook

Spring chinook salmon were formerly abundant in the Walla Walla subbasin but were extirpated in the mid 1900s (VanCleve and Ting 1960). The last run of importance was reported in 1925 and entered the river in May and early June (Van Cleve and Ting 1960). By 1955, only 18 spring chinook were reported to have been captured in the sport fishery (Oregon Game Commission 1956, 1957, cited in Van Cleve and Ting 1960). The decline of spring chinook runs was coincident with the construction of Nine Mile (Reese) Dam built in 1905 (Van Cleve and Ting 1960). Land use practices impacting spring chinook habitat and passage constraints associated with irrigation diversions have all been identified as primary causes of salmon extinction in the subbasin (e.g., Nielson 1950). Many of the major passage problems have recently been corrected or are in process.

Currently, there are at least 30 miles of suitable spawning and rearing habitat available for spring chinook in the upper mainstem and the North and South Forks Walla Walla River. Much of the suitable spawning and rearing habitat is in the South Fork Walla Walla River (at least 20 miles, RM 0-20). Water temperatures, flows, and habitat appear to be of equal or higher quality than the best chinook habitat in the Umatilla River where spring chinook are successfully reproducing naturally.

The South Fork Walla Walla River above Harris Park (RM 8) is in excellent condition with few human impacts and with some of the highest frequencies of pools and large woody debris in the region. Maximum water temperatures are below 15°C and flows are generally above 80 cfs during the summer. Survival and growth of spring chinook is expected to be excellent. The South Fork below Harris Park and the upper mainstem above Milton-Freewater have suitable water temperatures but some channelization and other human alterations have reduced the number of pools and large woody debris.

Currently there are at least 10 miles of suitable habitat for spring chinook spawning and rearing in Mill Creek (RM 17-27). Mill Creek habitat is similar to the South Fork Walla Walla except that it is a smaller system with lower flows (30 cfs during the summer). Monitoring has shown that mean water temperatures remain below 16.2°C during July and August. The upper basin is nearly pristine. Below the protected watershed, impacts include channelization and rural development. Overall, the habitat is very suitable for salmon above the mouth of Blue Creek (RM 17). Salmonids also rear successfully below the mouth of Blue Creek down to the Yellow Hawk Diversion at RM 11 although water temperatures exceed 21°C during summer afternoons.

During the last five years a few adult spring chinook have been observed at the Nursery Bridge trap in Milton-Freewater. The progeny of these fish have been collected during the fish salvage operations below irrigation diversions conducted by CTUIR and ODFW. These strays provide some indication that spawning, rearing, and migration habitat is suitable in the Walla Walla subbasin for spring chinook.

In 2000, 490 hatchery spring chinook salmon (Carson stock) were available from Ringold Hatchery and were transported to the CTUIR South Fork Walla Walla Brood Holding and Spawning Facility and held until just prior to spawning. Adult spring chinook salmon were out-planted into the Oregon portions of the South Fork Walla Walla River and Mill Creek to spawn naturally.

During spawning ground surveys CTUIR observed 96 spring chinook redds in the South Fork Walla Walla River and 40 redds in Mill Creek. This represents successful spawning of the 150 females, 76 males and 33 jacks released into the South Fork Walla Walla. In Mill Creek, 58 females, 31 males and 16 jacks were released. The redd to adult ratio in both the South Fork Walla Walla (42%) and Mill Creek (45%) was better than that observed in the Umatilla River (15-30 redds/100 adults during the last five years). Furthermore, the surveys in the Umatilla River are more complete than in Mill Creek and the Walla Walla because of difficulty in accessing private lands. Water quality and quantity in the Walla Walla is superior to that of the Umatilla River and allows better survival to spawning rates. Continued monitoring will determine the success of the out-planting project at the parr, smolt, and returning adult life-history stages.

Resident Redband Trout

Interior redband trout and steelhead (*O. mykiss*) are the most widely distributed and abundant salmonid species in the subbasin (Tim Bailey, ODFW, January 2001). However, very little is known about the Walla Walla redband due to the difficulty in distinguishing them from juvenile or residual steelhead. Resident redband trout in anadromous waters are included in the ESA listing of steelhead and are managed the same as steelhead. The degree of interaction between steelhead and resident redband trout is unknown. Spawning and rearing by large resident trout appears to be increasing in the basin (G. Mendel, WDFW, December 2000), but trend data is lacking. Redband are likely restricted to headwater reaches during periods of irrigation withdrawals or high water temperatures (U. S. Army Corps of Engineers 1997).

Lamprey

Pacific and brook lamprey were historically distributed throughout low gradient reaches in the Walla Walla subbasin according to tribal harvest records (Jackson et al. 1997). Pacific lamprey were historically harvested in the Walla Walla River by the Umatilla Tribe (Swindell 1940; Lane and Lane 1979). The current distribution and abundance of lamprey is considered severely depressed (Jackson et al. 1997), although information is incomplete. For several years during the 1960s and between 1985 and 1990, lamprey were either not counted or simply lumped into a large group of non-salmonids. From 1992 to 1995, 246 lamprey were counted at Walla Walla subbasin trap boxes by ODFW personnel, 73% of which were trapped at the Little Walla Walla River diversion (near RM 47). However, no attempts were made to differentiate Pacific from western brook lamprey (Jackson et al. 1997). During the fall of 1993, five lamprey ammocoetes were electrofished in the South Fork Walla Walla (near RM 6). In February 1996, thousands of lamprey ammocoetes were observed at the Little Walla Walla River diversion, though no attempt was made to identify the species. In July 1996, the CTUIR electrofished about 50 western brook lamprey in Mill Creek near a site once abundant with lamprey. In May 1997, the CTUIR recovered and released 51 western brook and four Pacific lamprey ammocoetes found in two dump truck loads of sediment removed from the rotary screens at the Little Walla Walla River diversion. Many other lamprey were impossible to recover. Assessments of the Walla Walla subbasin in 1998 documented lamprey larvae (not speciated) in eight of the twelve subwatersheds inventoried (Mendel et al. 1999). Average abundance was rare (1-3 individuals seen in sampled sites per subwatershed).

In the Touchet watershed, a 1996 electrofishing survey by the WDFW found five lamprey in sites sampled in the North Fork Touchet, three in Wolf Fork, and nine in the South Fork, although species were not determined. Electrofishing of three sites along the Touchet River in August 1997 revealed western brook lamprey, but no Pacific lamprey. The lamprey ranged in length from 32 to 169 mm, with stream temperatures ranging from 18 to 19ºC. Five additional sites sampled during August 1997 in the Walla Walla River revealed no Pacific lamprey and 31 western brook lamprey, all captured at the Little Walla Walla River diversion site (RM 47.0; Jackson et al. 1997). August 1999 CTUIR electrofishing surveys on the upper South Fork Touchet River within the Rainwater Wildlife area revealed three western brook lamprey (A. Childs, CTUIR, February 2001).

Bull Trout

Little was known about bull trout in the Walla Walla subbasin prior to the 1990s. Over the last decade surveys by federal, state, tribal, and local entities have provided important information regarding their distribution and status. The status of bull trout in Washington and Oregon (candidates for listing and critical, respectively) has occurred due to habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, and past fisheries management practices such as the introduction of nonnative species (Hanson et al. 2001).

Bull trout spawning and rearing in the Walla Walla subbasin is restricted to the upper watersheds of the Walla Walla River, Touchet River, Mill Creek, and some of the associated upper tributaries (Figure 16). Buchanan et al. (1997) described the South Fork Walla Walla River population as at low risk of extinction and the bull trout population in the North Fork Walla Walla River as at high risk of extinction. Population designations in the North and South Fork Walla Walla have recently been redefined. For instance, bull trout are currently documented as spawning in the North Fork Walla Walla and are now documented to spawn above Harris Park (not shown in Figure 16; T. Bailey, ODFW, February 2001). Furthermore, both groups of fish are now considered to represent a single subpopulation (J. Germond, ODFW, 1999). The Mill Creek subpopulation was rated as of special concern (Buchanan et al. 1997) but continues to support a stronghold designation (Quigley and Arbelbide 1997b; G. Mendel and M. Schuck, WDFW, 1999). Similar to the other subpopulations of bull trout in the subbasin, the Mill Creek fish are thought to be largely isolated from genetic exchange within the metapopulation—a factor of particular concern to some regional biologists (Buchanan et al. 1997).

In the Touchet River drainage, bull trout occur in the North, Wolf, and upper South Forks, Spangler, Lewis, Robinson, and Burnt Creeks (G. Mendel, WDFW, January 2001). Spawning has only been documented in the North, Wolf, and Burnt Forks and Spangler Creek. Newly identified spawning and rearing areas were recorded in Burnt Fork and the upper South Fork following WDFW surveys in 2000 and in the North Fork Walla Walla (G. Mendel, WDFW, January 2001; Hanson et al. 2001). Figure 16 does not show these areas as the map was produced prior to the collection of this data.

Bull trout are known to migrate downstream of Dayton during fall and winter and return upstream during spring and early summer. Both resident and migratory fish are present in the Touchet and Mill Creek systems. Their status is uncertain in the Touchet River system (Washington Department of Fish and Wildlife 1998). These locations are recognized as defining areas where subpopulations of a larger metapopulation likely occur. The degree of interaction among them is not well known at this time, and constitutes an important data gap. Any interchange between the populations would have to occur between late fall and spring when flows and temperatures permit movement.

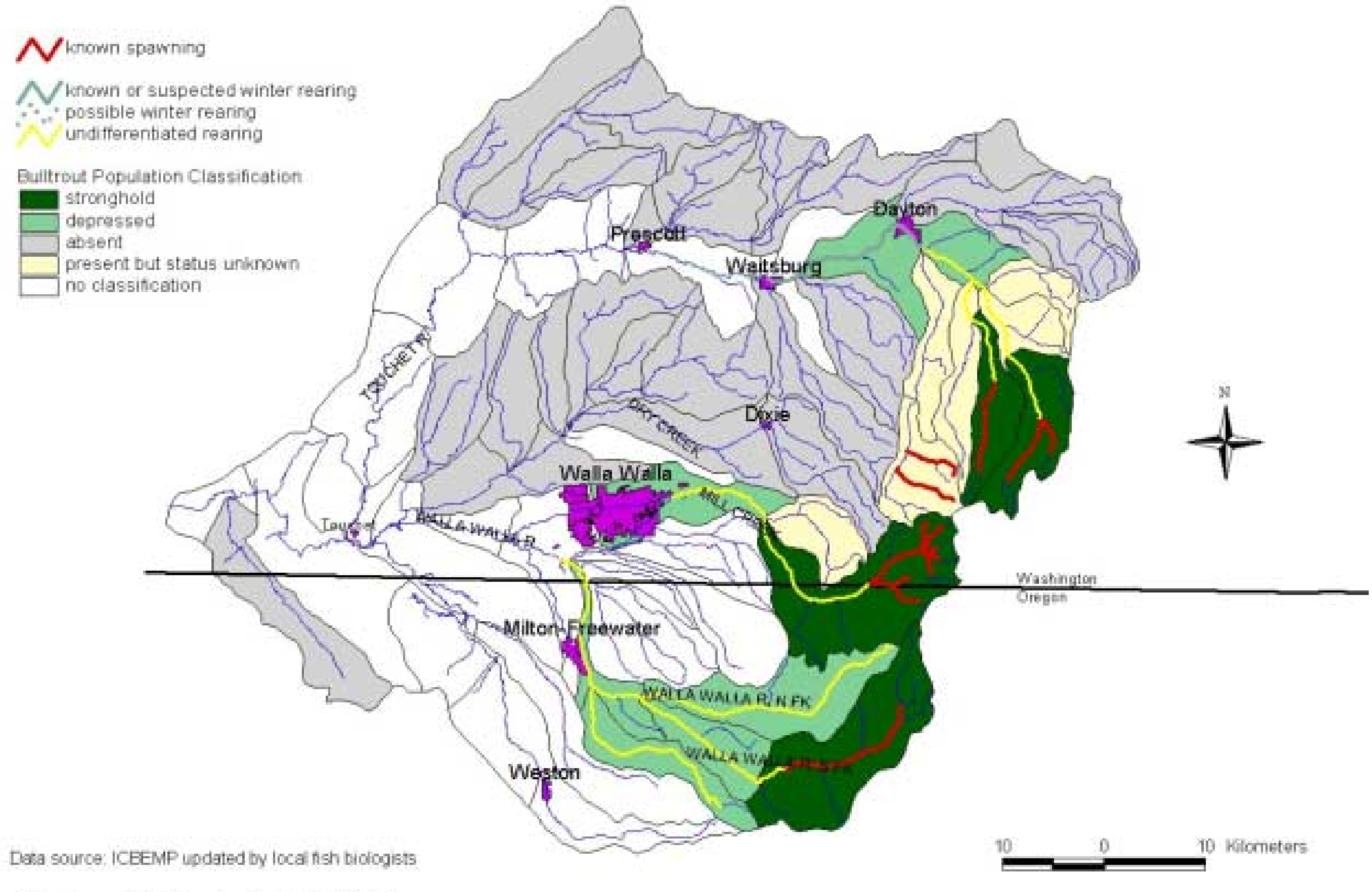
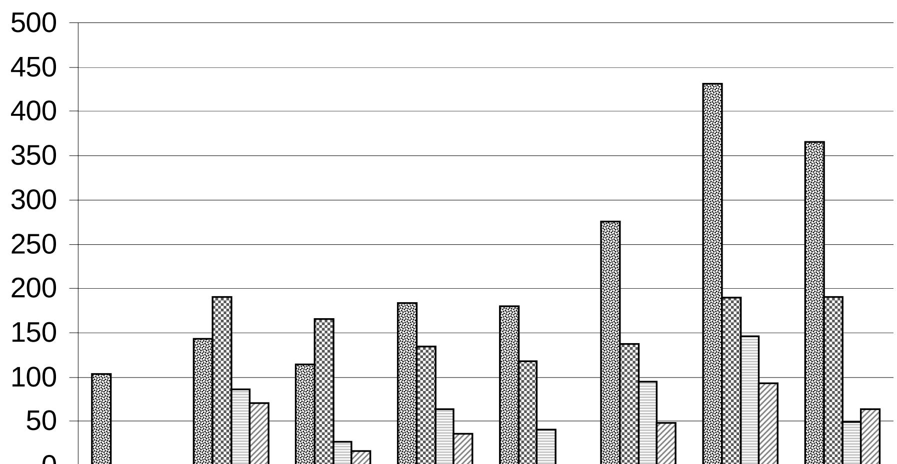


Figure 16. Bull trout spawning, rearing, and relative status in the Walla Walla subbasin (see text for updates).

Bull trout spawning begins in late August and emergence may not occur until September in the North Fork Touchet River and some headwater areas with cold water. Therefore, eggs or fry may be in the gravels at all times of the year (G. Mendel, WDFW, January 2001). Martin et al. (1992) and Underwood et al. (1995) estimated 3,925 juvenile bull trout in 4.1 km of Mill Creek in 1991 and 2,600 juvenile bull trout in a portion of the Wolf Fork in 1991. Although trend data prior to the 1990s is lacking, it is likely that juvenile abundance in Mill Creek has increased since 1985 following the installation of an adult fish ladder at the water intake dam on RK 22.2.

Bull trout redd inventories in the Walla Walla, Mill Creek, and Touchet watersheds have been conducted by the ODFW, WDFW, and USFS since the early 1990s (Figure 17). ODFW data indicate that adult bull trout numbers have increased substantially in the South Fork Walla Walla since initiation of the surveys. The increase is a possible result of habitat access modification and harvest closure in 1994 (Tim Bailey, ODFW, January 2001). Bull trout harvest in Washington portions of the subbasin was closed in the early 1990s. Frequent observations of large (>20 inches) adult bull trout have been documented during habitat and redd surveys in Oregon (Tim Bailey, ODFW, January 2001).



	1993	1994	1995	1996	1997	1998	1999	2000
South Fork Walla Walla	103	143	114	184	180	276	431	366
Mill Creek		191	165	134	118	137	190	191
Touchet River (NF)		86	27	64	41	95	146	49
Wolf Fork Touchet		71	16	36		48	93	64

*counts were incomplete in the South Fork Walla Walla during 2000 surveys due to high flows

Figure 17. Bull trout redd counts in the Walla Walla subbasin from 1993–2000 (Northrop 1998a; Germond et al. 1996, cited in Buchanan et al. 1997; Tim Bailey, ODFW, 2001; Mendel et al. 2000).

Brown Trout

The Washington Department of Game in 1965 first introduced exotic brown trout to the Touchet River. Fish were stocked annually to provide a fishery until 1998 when continued use of brown trout was deemed inconsistent with WDFW Wild Salmonid Policy and ESA concerns. Concerns over their piscivory and overlapping distribution with steelhead, spring chinook, and bull trout prompted the decision to discontinue the program.

This species continues to exist in low numbers in the major tributaries of the Touchet River and its mainstem (Mendel et al. 1999, 2000). Fish up to 6-8 lbs. have been observed and a small amount of juvenile fish production was documented in 2000 (G. Mendel, WDFW, January 2001). Juvenile fish of two age classes were sampled to determine if possible hybridization with rainbow trout has occurred. Washington biologists observed two distinct age classes (0 and 1+) of a supposed hatchery hybrid rainbow×brown trout at two different sites. Genetic samples are being analyzed by the WDFW to determine the makeup of the fish.

Whitefish

Extensive snorkel and electrofishing surveys in the Washington portion of the Walla Walla subbasin indicate that whitefish exist in low abundance, and their distribution is limited to mainstem rivers and larger tributaries (Mendel et al. 1999, 2000, January 2001). Reproduction appears limited as few juveniles were observed in these surveys.

Other Species of Concern

The distribution of margined sculpin is limited to portions of the Blue Mountains (Mongillo and Hallock 1998). They are known to exist in the Walla Walla subbasin where they are listed as a state sensitive species in Washington. Umatilla dace, reportedly exist in the subbasin and are a state candidate species in Washington. Freshwater shellfish, once abundant and commonly used by Native Americans, are now believed to be severely depressed (D. Close, CTUIR, February 2001).

Wildlife

The Walla Walla subbasin is inhabited by approximately 10 amphibian species, 207 bird species, 69 mammal species, and 15 reptile species during all or part of the year (Appendix B). The list of wildlife species present in the subbasin was constructed using the coarse (1:2,000,0000) scale
species maps developed for the Interior Columbia Basin Ecosystem Management Project (ICBEMP) and updated based on the experience of local wildlife biologists. The list may not be a complete listing of all vertebrate species ever observed in the subbasin and may contain species that very rarely or no longer occur in the subbasin. For example, the leopard frog and lynx were observed in the subbasin historically, but recent surveys have failed to detect their presence (McAllister et al. 1999; Stinson 2000). Detailed information on wildlife population numbers and locations is scarce with most in depth data focused on the well-studied game species.

Of the 335 wildlife species listed in Appendix B, many are of special concern to the wildlife managers in the subbasin. Forty-two of the subbasin's wildlife inhabitants have listed or candidate status in Oregon State, Washington State, at the federal level, or are of special concern to the USFS (Table 19; Washington Department of Fish and Wildlife 2000a; Oregon Department of Fish and Wildlife 2000a; U. S. Forest Service 1990). Many not yet listed species in the subbasin have been identified as having declining population trends.

Table 19. Listed wildlife species within the Walla Walla subbasin (Washington Department of Fish and Wildlife 2000a; Oregon Department of Fish and Wildlife 2000a; U. S. Forest Service 1990).

Species	Status
American Marten *Martes americana*	OR-SV, FS-MIS
Bank Swallow *Riparia riparia*	OR-SU
Black-backed Woodpecker *Picoides arcticus*	WA-C
Boreal Owl *Aegolius funereus*	OR-SU
Burrowing Owl *Athene cunicularia*	WA-C, OR-SC, US-SpCon
Ferruginous Hawk *Buteo regalis*	WA-T, OR-SC, FS-S, US-SpCon
Flammulated Owl *Otus flammeolus*	WA-C, OR-SC, FS-S
Fringed Myotis *Myotis thysanodes*	OR-SV, US-SpCon
Golden Eagle *Aquila chrysaetos*	WA-C
Grasshopper Sparrow *Ammodramus savannarum*	OR-SV
Great Gray Owl *Strix nebulosa*	OR-SV, FS-S
Loggerhead Shrike *Lanius ludovicianus*	WA-C, OR-SV,US-SpCon
Long-billed Curlew *Numenius americanus*	OR-SV
Long-eared Myotis *Myotis evotis*	OR-SU, US-SpCon
Long-legged Myotis *Myotis volans*	OR-SU,US-SpCon
Lynx *Lynx canadensis*	WA-T,US-T
Merriam's Shrew *Sorex merriami*	WA-C
Northern Goshawk *Accipiter gentilis*	WA-C, OR-SC, US-SpCon
Northern Leopard Frog *Rana pipiens*	WA-E
Northern Pygmy-owl *Glaucidium gnoma*	OR-SC
Olive-sided Flycatcher *Contopus borealis*	OR-SV, US-SpCon
Pallid Bat *Antrozous pallidus*	OR-SV
Peregrine Falcon *Falco peregrinus*	WA-E, OR-E, FS-S, US-E
Pileated Woodpecker *Dryocopus pileatus*	WA-C, OR-SV,FS-S
Preble's Shrew *Sorex preblei*	FS-S
Pygmy Nuthatch *Sitta pygmaea*	OR-SC
Rocky Mountain elk *Cervus elaphus*	FS-MIS
Sage Thrasher *Oreoscoptes montanus*	WA-C
Sagebrush Lizard *Sceloporus graciosus*	OR-SV, US-SpCon
Silver-haired Bat *Lasionycteris noctivagans*	OR-SV

Key
Washington State Listed-WA
Oregon State Listed-OR
Forest Service Listed-FS
Federally Listed-US
Washington Codes
Endangered-E
Threatened-T
Candidate-C
Oregon Codes
Sensitive, Critical-SC
Sensitive Vulneable-SV
Sensitive Unknown-SU
United State Codes
Threatened-T
Candidate-C
Species of concern-SpCon
Forest Service Codes
Sensitive-S
Management Indicator-MIS

Species	Status	
Striped Whipsnake *Masticophis taeniatus*	WA-C	
Swainson's Hawk *Buteo swainsoni*	OR-SV,FS-S	
Tailed Frog *Ascaphus truei*	OR-SV, US-SpCon	
Three-toed Woodpecker *Picoides tridactylus*	OR-SC, FS-MIS	
Vaux's Swift *Chaetura vauxi*	WA-C	
Washington Ground Squirrel *Spermophilus washingtoni*	WA-C, US-C	
Western Boreal Toad *Bufo boreas*	WA-C, OR-SV, US-SpCon	
Western Small-footed Myotis *Myotis ciliolabrum*	OR-SU, US-SpCon	
White-headed Woodpecker *Picoides albolarvatus*	OR-SC, FS-MIS	
White-tailed Jackrabbit *Lepus townsendii*	WA-C, OR-SU	
Wolverine *Gulo gulo*	WA-C, OR-T, FS-S US-SpCon	

The subbasin is also home to many valuable game species. Game species harvested in the Walla Walla subbasin in 1999 included mule and white-tailed deer, Rocky Mountain elk, black bear, cougar, turkey, pheasant, California quail, chukar partridge, Hungarian partridge, forest grouse, snipe, mourning dove, and multiple waterfowl species. Trapped furbearers include badger, beaver, coyote, mink, muskrat, otter, skunk, raccoon, and weasel (Washington Department of Fish and Wildlife 2000b; Oregon Department of Fish and Wildlife 2000b).

Landbirds include all migratory and resident birds in the subbasin. These birds account for a significant portion of the biological diversity in the Walla Walla subbasin. Approximately 207 species of landbirds occur in the subbasin; making up about 69% of the terrestrial fauna species in the Walla Walla (Appendix B). Fire suppression, timber management, and the resulting changes in the structure and distribution of vegetation communities have influenced the distribution and abundance of many avian species (Marcot et al. 1997). Some species that have declined in abundance regionally include white-headed woodpecker, flammulated owls, and Columbia sharp-tailed grouse (Saab and Rich 1997; Andelman and Stock 1994a, 1994b; Table 20). Conversely, past practices have increased habitat suitability for some species. Species that have increasing or stable trends in the region include Wilson’s warbler, chipping sparrow, varied thrush, and western tanager (Saab and Rich 1997; Andelman and Stock 1994a, 1994b). Implementation of the conservation recommendations for priority habitats and species defined by Altman and Holmes (2000a, 2000b) in the Conservation Strategy’s for landbirds of Oregon and Washington is considered the best strategy for conservation of the subbasin’s landbird populations.

Table 20. Landbird species inhabiting the Walla Walla subbasin with identified declining population trends.

Species	Primary Habitat for Breeding
American kestrel[1]	coniferous forest, grassland
Mourning dove[1]	coniferous forest, riparian
Vaux's swift[1]	coniferous forest, riparian
Rufous hummingbird[1]	coniferous forest, riparian
Belted kingfisher[1]	riparian
Lewis' woodpecker[2]	coniferous forest, riparian
Williamson's sapsucker[1]	coniferous forest, riparian
Olive-sided flycatcher[3]	coniferous forest
Western wood-pewee[1]	coniferous forest, riparian
Violet-green swallow[1]	coniferous forest, riparian
Barn swallow[1]	riparian
Rock wren[1]	grassland, cliff, rock, talus
Swainson's thrush[1]	coniferous forest, riparian
Varied thrush[1]	coniferous forest
Orange-crowned warbler[1]	riparian
Wilson's warbler[1]	riparian
Western tanager[1]	coniferous forest, riparian
Chipping sparrow[1]	coniferous forest
White-crowned sparrow[1]	riparian
Dark-eyed junco[1]	coniferous forest, riparian
Western meadow lark[3]	grassland
Pine siskin[2]	coniferous forest
American goldfinch[1]	riparian

[1]Species identified as having a "significant declining population trend" by Andleman and Stock 1994
[2]Species identified as being a "high concern to management" by Saab and Rich 1997
[3]Species identified as declining by Andleman and Stock 1994 and Saab and Rich 1997

Focal Species

Focal species were selected to represent groups of species of management concern in the subbasin. Target species used for the McNary hydroelectric facility habitat evaluation procedure (HEP) loss assessment were selected to represent measured losses previously amended into the NWPPC program (Table 21; Childs et al. 1997; U. S. Fish and Wildlife Service 1980). Focal species also were selected based on forest, shrubsteppe, and wetland/riparian habitat requirements since habitat loss is the primary factor in the population declines of many of the subbasin’s wildlife species. Extirpated and managed species were also selected as focal species to address reintroduction and game management concerns. By managing for species representative of important components of the functioning ecosystem, many other species will also be conserved.

Table 21. Target species selected for the McNary project

Evaluation Species	Rationale for Selection
Spotted Sandpiper (*Actitis macularia*)	A representative of migratory shorebirds that utilize the sparsely vegetated islands, mudflats, shorelines, and sand and gravel bars associated with the John Day and McNary Project areas. This habitat comprised the third largest loss of terrestrial acreage resulting from hydropower development in the McNary project area.
Canada Goose (*Branta canadensis*)	A migratory bird of national significance. Sensitive to island nesting habitat and associated shoreline brooding areas. Cultural significance.
Great Blue Heron (*Ardea herodias*)	Carnivore that forages on a variety of vertebrates in shallow water. The sand/gravel/cobble/mud shorelines of the reservoirs are commonly used as foraging areas. Existing HEP model available, which is sensitive to changes in these habitats. Cultural significance.
Yellow Warbler (*Dendraica petechia*)	Represents species which reproduce in riparian shrub habitat and make extensive use of adjacent wetlands. Existing HEP model which is sensitive to the targeted habitats - riparian shrub and adjacent wetlands.
Black-Capped Chickadee (*Parus atricopillus*)	Representative of species utilizing mature forest canopies. Forest cavity nesters. HEP model available.
Mink (*Mustela vison*)	Carnivorous furbearer, feeds on wide variety of vertebrates. Utilizes shoreline and adjacent shallow water habitats. HEP model available. Cultural significance.
Western Meadowlark (*Sturnella neglecta*)	A species common to shrub-steppe/grassland habitat, the largest terrestrial habitat type flooded by the hydroelectric projects. This bird is well known for its melodious song, feeds primarily on insects and seeds.
California Quail (*Lophortyx californicus*)	A species commonly associated with the shrubsteppe/grassland habitat. This game bird feeds on seeds and greens in brushy and grassland areas.
Mallard (*Anas platyrhynchgos*)	The mallard utilizes a broad range of cover types including riparian herb, emergent wetlands, and islands for nesting, brood rearing, and wintering habitat. Recreational significance.
Downy Woodpecker (*Picoides pubescens*)	This woodpecker represents a species that feeds and reproduces in a tree environment. The downy woodpecker HEP model was selected to measure the riparian tree cover type. Its diet is primarily insects with some seeds and fruits.

Forest-Dependent Species

Flammulated Owl

The current status and distribution of the flammulated owl in the Walla Walla subbasin is undetermined. Flammulated owls are broadly distributed throughout the Blue Mountain ecological reporting unit (ERU) though the availability of source habitats for the species is thought to have declined (Wisdom et al. 2000). Flammulated owls have been documented in or adjacent to the Walla Walla subbasin. Flammulated owls depend on old growth ponderosa pine forests with high densities of snags. They typically nest in cavities abandoned by northern flicker and pileated woodpecker. The flammulated owl was selected as a focal species to represent species dependent on old growth ponderosa pine.

MacGillivray's Warbler

Regionally, MacGillivray's warbler has exhibited a non-significant short-term (1980-1996) declining trend of 2.1% per year (Altman and Holmes 2000a, 2000b). The current population status and distribution of MacGillivray's warbler in the Walla Walla subbasin is undetermined. However, the warbler has been documented numerous times in or adjacent to the subbasin over the last few years (Pyle et al. 1999). Preferred habitat for the warbler includes mixed conifer forests with a dense shrub layer in openings or in the understory (Altman and Holmes 2000a, 2000b). The MacGillivray's warbler is vulnerable to cowbird parasitism in areas where habitat fragmentation has allowed cowbirds to colonize. Reductions in shrub cover due to grazing intensity, wildfires, herbicide treatments and prescribed burns can reduce the suitability of habitats for the MacGillivray's warbler (Altman and Holmes 2000a, 2000b).

Canada Lynx

The current population status and distribution of the Canada lynx in the Walla Walla subbasin is unknown. Surveys failed to detect the lynx within and adjacent to the subbasin in 1999 and the species may have been extirpated from the area (Stinson 2000). The secretive nature of the lynx makes it difficult to conclusively establish its presence or absence. The lynx was recently listed federally as threatened, but is naturally rare in the subbasin (Stinson 2000). Three unconfirmed sightings of lynx have occurred west of Tollgate along State Route 244 within the last five years. Preferred habitat for the lynx consists of high elevation (> 4500') stands of cold and cool forest types with a mosaic of structural stages for foraging and denning. Primary habitat consists of subalpine fir, Englemann spruce, and lodgepole pine (Ruediger et al. 2000; Ruggiero et al. 1999). Lynx habitat occurs at the higher elevations and along the eastern edge of the subbasin. Portions of USFS lynx analysis units (LAU) #2, #3, #5, and #6 occur in the Walla Walla subbasin.

Wolverine

Current population status and distribution of wolverine in the Walla Walla subbasin is unknown. Winter snow track surveys were conducted in 1991 and 1992 for wolverine just east of the subbasin. Verifiable sightings or tracks have yet to be documented; however, miscellaneous sighting have occurred in the Walla Walla District near the western edge of the Wenaha-Tucannon Wilderness area within the last five years. The wolverine prefers high elevation conifer forest types with a sufficient food source and limited exposure to human interference. While foraging habitat occurs throughout the subbasin, potential natal denning habitat is limited to select areas near the eastern edge of the Walla Walla subbasin. Although occurrence was never common, the wolverine inhabits mountainous regions throughout the subbasin. Connectivity of boreal forest habitats and seclusion for winter den sites appear to be key factors for this wilderness species (Marshall et al. 1996).

Shrubsteppe Dependent Species

Shrubsteppe communities consist of one or more layers of perennial grass with a conspicuous but discontinuous layer of shrubs above (Daubenmire 1988). A number of wildlife species associated with shrubsteppe and grassland habitats are listed as Oregon sensitive species. These include the long-billed curlew, loggerhead shrike, sage sparrow, grasshopper sparrow, burrowing owl, ferruginous hawk, Swainson's hawk, black-throated sparrow, sagebrush lizard, Washington ground squirrel, and white-tailed jackrabbit. Burrowing owl, loggerhead shrike, and ferruginous hawk were selected as focal species for this habitat type.

Burrowing Owl

The burrowing owl is listed as a state candidate species. Burrowing owl populations in the subbasin have declined significantly over the last 25 years. Only five nesting pairs were documented in Walla Walla County during the 2000 survey, and only two pairs nested successfully (Peggy Bartels, personal communication). The loss of habitat to agricultural development and rural housing development appear to be the main factors contributing to the decline.

Loggerhead Shrike

Data from the USFWS breeding bird survey shows a highly significant decline ($p < .01$ of 2.7% a year for the species in the Columbia plateau region from 1968 to 1998 (Sauer et al. 1999). The loggerhead shrike is associated primarily with sagebrush and juniper steppe, particularly high density, tall sagebrush plants with a variety of understory conditions (Altman and Holmes, 2000a, 2000b). However, bare soil understory (including that with cryptogrammic crust) is favored by feeding shrikes (Leu 1995). According to ICBEMP analysis, the big sagebrush habitat type has declined approximately 50% in the Columbia plateau (Wisdom et al. 2000).

Ferruginous Hawk

The ferruginous hawk is listed as a state threatened species and is dependent on large areas of shrubsteppe habitat. Rabbits and hares, ground squirrels, pocket gophers, and kangaroo rats make up 94.6% of the prey base for ferruginous hawks (Olendorff 1993). Only 14 nesting pairs of ferruginous hawk were documented within the subbasin in 1997 (Washington Department of Fish and Wildlife 1997). Artificial nesting structures (42) were constructed within the subbasin in 1993 (Washington Department of Fish and Wildlife 1993) under gas pipeline mitigation. This project provided nest structures within the subbasin where nesting habitat is limited.

Ferruginous hawks (*Buteo regalis*) are prominent shrubsteppe raptors throughout Washington State. Statewide, occupancy rates of this species are low. Since 1987, < 27% of historic ferruginous hawk territories ($n = 222$) have been occupied annually. Consequently, nesting populations have declined to levels where ferruginous hawks are a state designated threatened species. Twenty-seven ferruginous hawk territories are documented within the Walla Walla subbasin. Breeding data in 1995 from complete subbasin surveys found only 22% occupancy (Jim Watson, WDFW, February 2001).

Reasons for low occupancy of ferruginous hawks territories in Washington State and in the Walla Walla subbasin are unknown. Regional declines of ferruginous hawks have been tied to changes in native habitat conditions from such factors as cultivation and grazing that may be associated with prey declines. Changes in the abundance and distribution of prey associated with shrubsteppe habitats in the subbasin, particularly blacktail jackrabbits (*Lepus californicus*) and Washington ground squirrels (*Spermophilus washingtoni*), may reduce nesting of ferruginous hawks. Historic information suggests black-tailed jackrabbits were important prey for nesting ferruginous hawks in Washington, but a sampling of 34 nests in 1995 found an absence of jackrabbits and ground squirrels and a predominance of northern pocket gophers in the diet. Due to statewide declines, blacktail jackrabbits are being considered for threatened species listing, and Washington ground squirrels are a protected species in the state. Further investigation of the relationship between ferruginous hawk populations and prey is warranted based on their statewide status (Jim Watson, WDFW, February 2001).

The Washington ground squirrel is PHS and state candidate species. The loss of shrubsteppe and grassland habitats to agricultural development and livestock grazing has resulted in the loss of Washington ground squirrel colonies. Historical colonies were surveyed in 1997, but no ground squirrels were observed.

Wetland and Riparian-Dependent Species

Declines in the quality and quantity of wetland and riparian habitat in the subbasin have negatively impacted the many wildlife populations that depend on this habitat type. Of the 10 amphibian species that occur in the subbasin (Appendix B), the northern leopard frog (*Rana pipiens*), spotted frog (*Rana pretiosa),* western toad (*Bufo boreas*), tailed frog (*Ascaphus truei*), and woodhouse's toad (*Bufo woodhousii*) are listed as sensitive by the ODFW (Marshall et al. 1996). Of these, the northern leopard frog, tailed frog, and spotted frog are sublisted as critical, while the western toad and woodhouse's toad are considered vulnerable and peripheral or naturally rare, respectively. The spotted frog was formerly considered threatened in western Oregon by ODFW, but subsequently sublisted as critical due to lack of documentation on its disappearance. It is currently a category 2 species on USFWS' Notice of Review for its entire range (Marshall et al. 1996). In Washington the leopard frog was recently listed as endangered while the western toad is a candidate for listing (Washington Department of Fish and Wildlife 2000a).

Leopard Frog

Although common historically the northern leopard frog, may have been extirpated from the subbasin. Twenty-five of the 42 museum records of leopard frogs collected in Washington State were collected in the Walla Walla subbasin. These records range in date from 1881 to 1970 and were obtained from a variety of locations in Walla Walla County (McAllister et al. 1999). In Oregon, past records show northern leopard frog habitat in wetlands in Umatilla County (Nussbaum et al. 1983). Leopard frog surveys conducted in the subbasin during the 1990s by WDFW and ODFW failed to detect the species (McAllister et al. 1999; Kevin Blakely, ODFW, January 2001).

Spotted Frog

The current status and distribution of the spotted frog in the Walla Walla subbasin is undetermined. However, the frog occurs sporadically throughout the Blue Mountains. The spotted frog has occasionally been observed in the middle and lower elevations of the subbasin since 1995. Preferred habitat for the frog consists of marsh, permanent ponds, and slow streams usually with abundant aquatic vegetation (Marshall et al. 1996). Suitable habitat for the spotted frog can be found in the Walla Walla subbasin along the numerous streams and a few wet meadows or seeps.

Red-eyed Vireo

Altman and Holmes (2000a, 2000b) identified the red-eyed vireo as a riparian woodland canopy foliage focal species. The red-eyed vireo is an obligate for mature, riparian deciduous forest with high canopy closure and foliage volume. Regional breeding bird surveys indicate the red-eyed vireo has experienced a highly significant long-term (1966-1996) declining trend of 3.1% per year and a highly significant short-term (1980-1996) declining trend of 3.0% per year (Altman and Holmes 2000a, 2000b). The vireo is known to occur in the subbasin along low elevation streams. Preferred habitat for the vireo includes mature, riparian deciduous forest with high canopy closure and foliage volume. Protection of habitat for the red-eyed vireo should provide habitat for many of the riparian-dependent wildlife species in the subbasin.

Bald Eagle

Currently, the bald eagle is not known to nest in the Walla Walla subbasin. Wintering eagles are occasionally observed in the subbasin, but their population status and distribution is undetermined. Preferred nesting habitat for bald eagles is predominately coniferous, uneven-aged stands with an old growth component near a large body of water (i.e., rivers or lakes) that supports an adequate food supply (Marshall et al. 1996). Wintering and potential nesting habitat occurs along the larger streams and rivers in the subbasin.

Great Blue Heron

The blue heron is listed as a priority habitat species (PHS) in Washington. Two known heron rookeries occur within the subbasin, one on the Walla Walla and one on the Touchet River. The Walla Walla River rookery contains approximately 13 active nests. The Touchet River rookery contains approximately 8-10 active nests. Disturbance from housing developments, industry, logging, etc. can result in abandonment of rookeries. Maintaining adequate riparian habitat for nesting where human disturbance is minimal is important for heron rookeries located within the subbasin (Paul Allen, WDFW, February 2001).

Managed Species

Elk

Based on nationwide Forest statistical reports, the UNF has supported one of the largest Rocky Mountain elk herds in the country during the 1970s and 1980s (U. S. Forest Service

1990). Elk densities in the region are still among the highest in Oregon State, achieving their highest levels in the neighboring Umatilla subwatershed (Oregon Department of Fish and Wildlife 1986). This high carrying capacity is attributed to timber harvest activities that have increased the availability of forage. However, timber harvest levels may now have exceeded the level at which elk habitat is improved and the amount of available cover may be limiting elk populations (U. S. Forest Service 1990). The Walla Walla subbasin contains approximately 342 sq/mi of winter elk range and 384 sq/mi of summer elk range (Figure 18). Winter elk range is considered the habitat type most limiting to elk in the subbasin.

Elk populations in the subbasin are at or near management objectives. The Washington portion of the subbasin contains three elk management units: 154-Blue Creek, 157-Watershed, 162-Dayton. The population management objective for the three units is 1,600 elk (Washington Department of Fish and Wildlife 2000c). The results of pre-season elk surveys for this population are displayed in Figure 19. The Oregon portion of the subbasin is contained in the Walla Walla unit where the management objective is 1,800 elk (Oregon Department of Fish and Wildlife 1986). Populations in the unit have been estimated as slightly below the objective for the last few years (Figure 20).

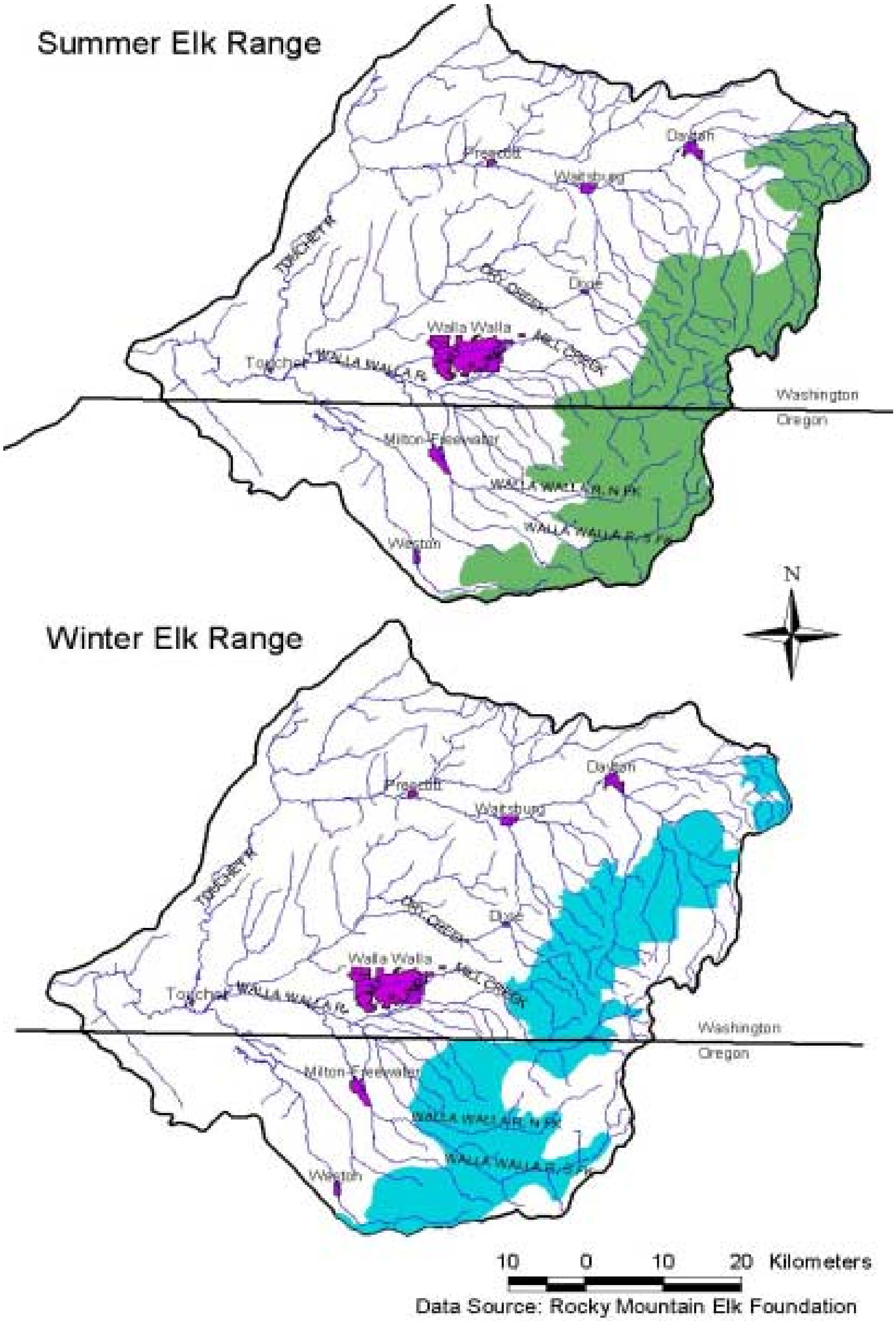


Figure 18. Summer and winter elk range in the Walla Walla subbasin.

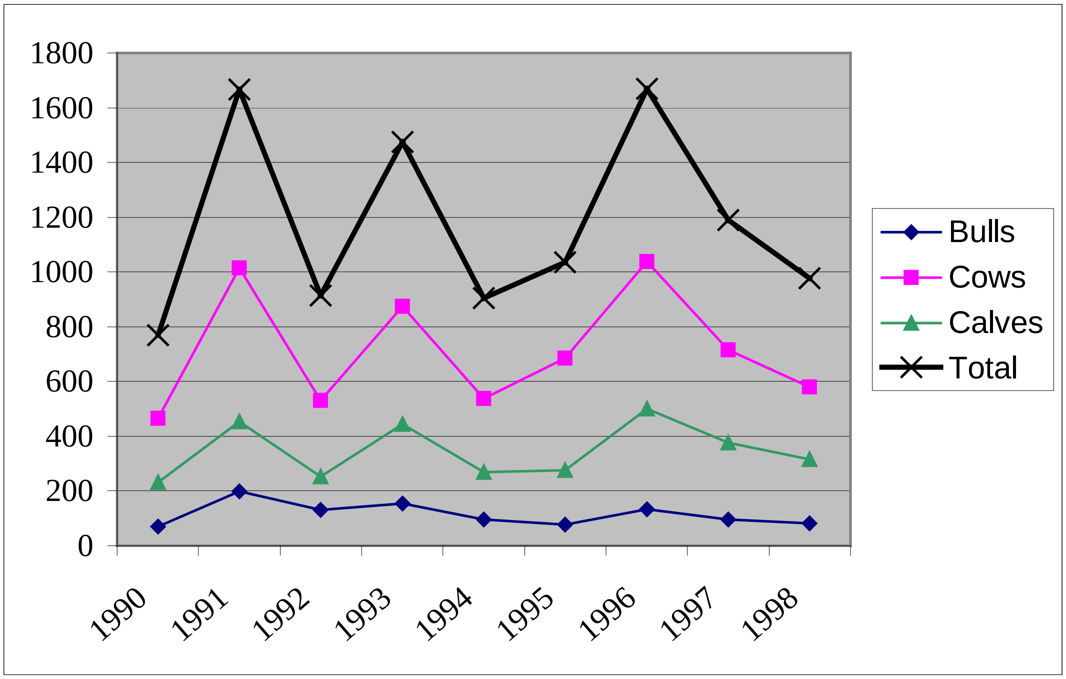


Figure 19. Pre-season elk survey summary for the Blue Mountains Region of Washington (Washington Department of Fish and Wildlife 2000c).

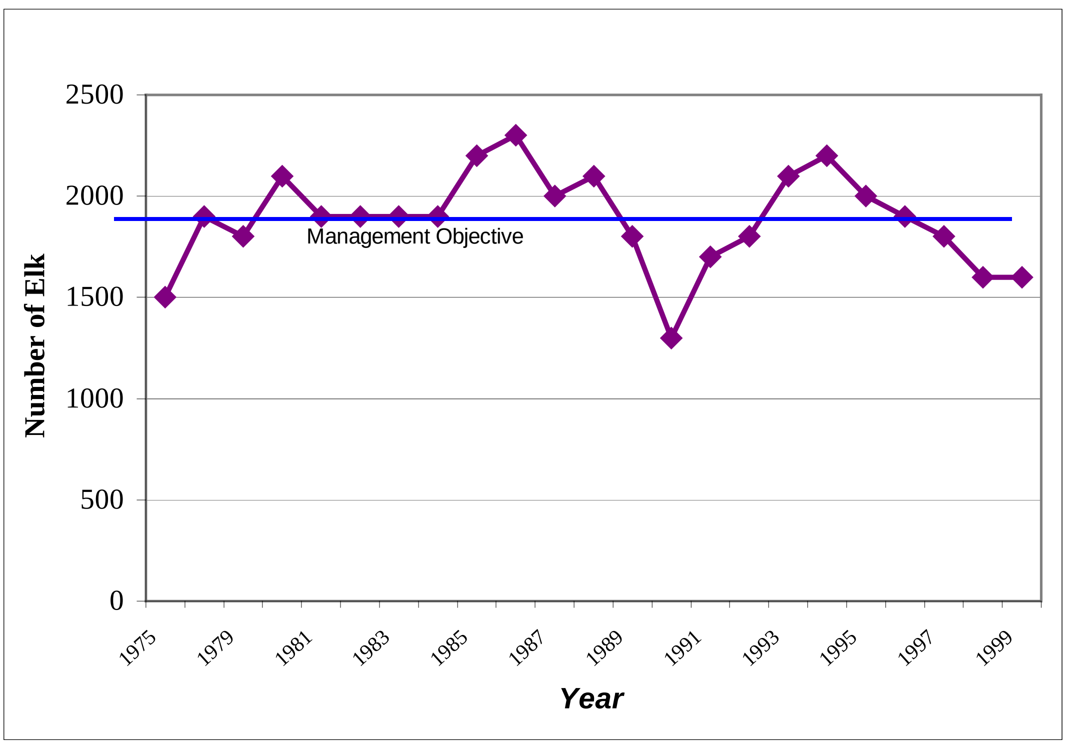


Figure 20. Elk population estimates in the Walla Walla Game Management Unit of Oregon.

Use of the Mill Creek watershed as summer and fall range has declined significantly over the last 10 years from deteriorating habitat conditions due to land subdivision, logging, road building, OHV trail use, livestock grazing, noxious weeds, and fire suppression (Perry and Overly 1977). The deteriorating condition of native habitats may be one of the major reasons agricultural damage conflicts are increasing (Myers et al. 1999). Elk may be forced to spend more time in agricultural areas, causing increasing conflicts with landowners.

A study of the Washington population found summer calf production to be optimal with a calf ratio of 63 ca./100 cows, but by spring calf ratios showed significant mortality (18 ca./100 cows). A study identifying calf mortality factors between 1992-1998 showed that calves suffered an annual mortality rate of at least 58%, with predation accounting for 78% of the mortality. Cougar and bear were the primary predators involved (Myers et al. 1999).

Deer

Two *Odecoileus* species occur in the subbasin, the mule deer (*Odecoileus hemionus*) and the white-tailed deer (*Odecoileus virginianus*). Mule deer dominated in upper elevation forested habitats and arid lowland areas. White-tailed deer typically are the dominant deer species in riparian areas with a constant flowing water source, and in foothill areas with hawthorn groves in the draws and hillsides (U. S. Army Corp of Engineers 1997). The two species sometimes overlap and competition between them can be a problem (Washington Department of Fish and Wildlife 2000c). However, the extreme susceptibility of white-tailed deer to the disease Blue Tongue contributes to a separation between habitats used by the two species. White-tailed deer are usually not found in arid habitats due to the prevalence of Blue Tongue in these environments (Mark Kirsch, ODFW, January 2001).

Whitetail deer populations have increased in most game management units in the region in the last few years despite an outbreak of Epizootic Hemorrhagic Disease (EHD) in September 1998. EHD hit the whitetail deer population near Prescott, Washington particularly hard. Estimates of losses to this and neighboring whitetail populations during this outbreak range from 500-1,500 individuals. Good forage conditions in the last two years followed by mild winters resulted in minimal over-winter mortality and excellent fawn production and survival (Washington Department of Fish and Wildlife 2000c).

Rocky Mountain mule deer are a PHS and primary big game species within the subbasin. Game management units 154, 157, 162, and approximately 60% of GMU-149 lie within the subbasin. Mule deer populations in the lowland habitat (GMU-149) increased significantly over the last 15 years, while mule deer populations in units 154, 157, and 162, have declined dramatically. In units 154 and 162, the percentage of mule deer bucks in the harvest has declined from an average of 80% in 1985 to an average of 30% in 1999, while the average annual buck harvest remained fairly stable. Mule deer population trends for the Blue Mountain region of Washington are shown in Figure 21. This includes information on deer outside the subbasin and combines counts of foothill and mountain mule deer populations. Mule deer populations in the foothills are considered at good levels, whereas those in the mountains are depressed. This discrepancy is likely due to poor habitat conditions in the forested lands caused by high road densities, logging activities, and fire suppression. The Pomeroy Ranger District, which manages the USFS lands within the subbasin, is in the process of evaluating road closures and prescribed burn for habitat improvements (Washington Department of Fish and Wildlife 2000c).

Mule deer populations for the Oregon section of the Walla Walla subbasin are below the ODFW's management objective of 1,900 animals (Figure 22). Mule deer populations in Oregon peaked during the mid 1950s and early 1960s and have declined since then. Overgrazing by domestic livestock and increases in large predator populations are considered factors in the decline.

Cougar

Cougar populations in the subbasin seem to be increasing. Complaints have increased from almost nonexistent levels prior to 1990. Multiple sightings have occurred in areas where cougar have not been reported in the past such as west of the town of Walla Walla. A cougar was observed several times during 1999 in an isolated area of habitat containing a small population of whitetail deer between the cities of Walla Walla and College Place. One cougar was immobilized and removed from a residence outside Dayton. Cougar harvest rates in the subbasin have declined since the passing of Initiative 655 in Washington and Measure 18 in Oregon. Both laws prohibit the use of hounds when hunting cougar (Washington Department of Fish and Wildlife 2000c). Cougar densities in the forested region of the subbasin are estimated at around 1/8 square miles (Akenson 1993).

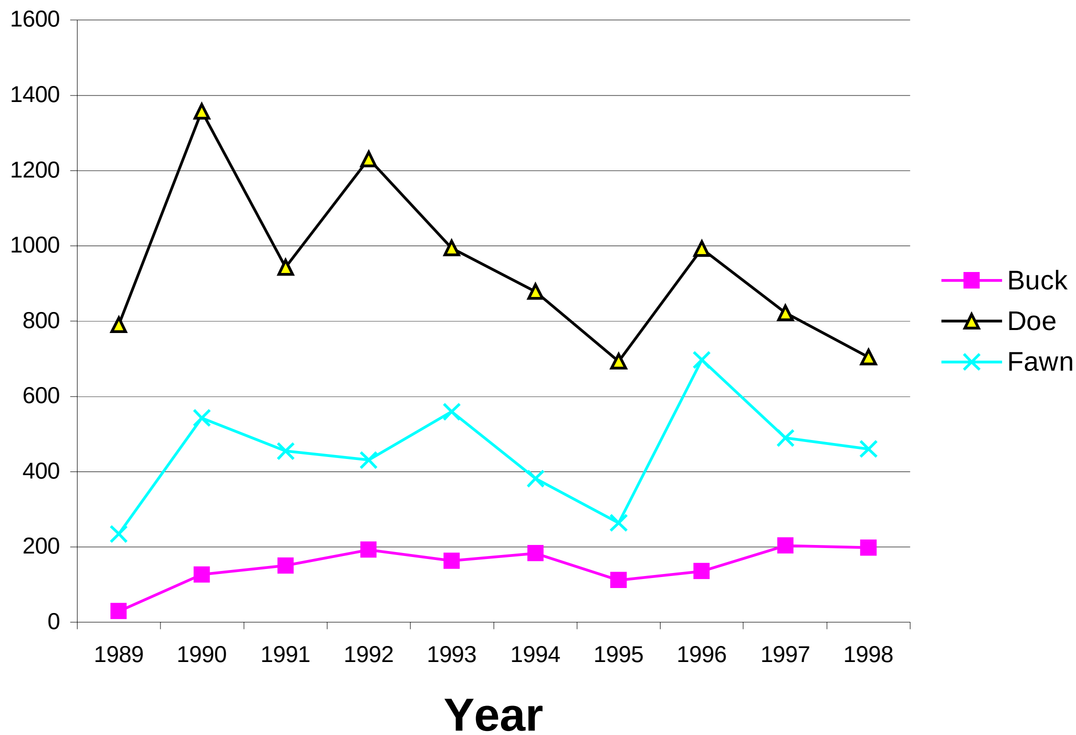


Figure 21. Post-season mule deer surveys for the years 1989-1998 taken in the Blue Mountain region of Washington (Washington Department of Fish and Wildlife 2000c).

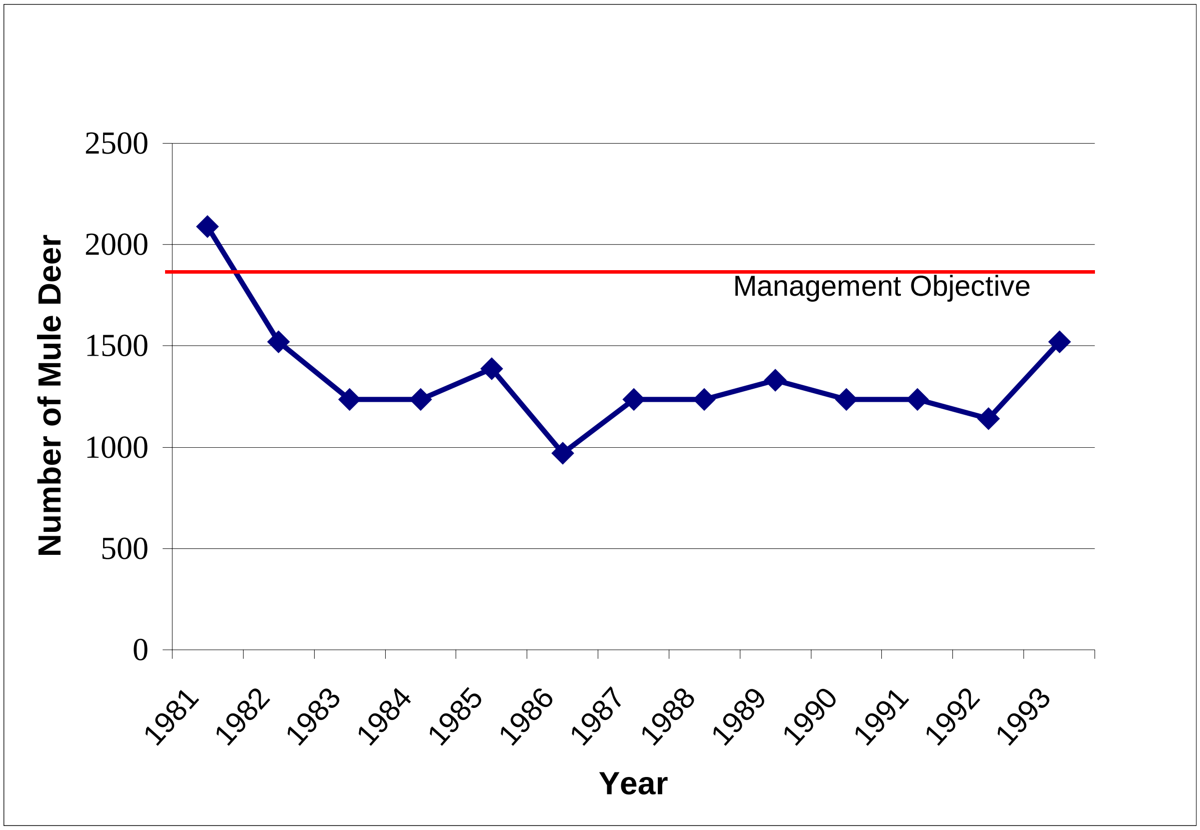


Figure 22. Mule deer population estimates in the Walla Walla Game Management Unit of Oregon.

Black Bear

The black bear is an indicator of ecosystem health (Oregon Department of Fish and Wildlife 1993a) and among the nine species determined by Cederholm et al. (2000) to have a strong consistent link to salmon. However, bears in high densities pose management challenges. Bears can cause financial losses to the timber industry when they peel away bark to eat the cambium layer of trees. In extreme cases this causes the death of the tree, and in less severe cases will cause the tree to grow at a reduced rate. High levels of bear predation on elk calves may be a factor in poor calf recruitment rates (Oregon Department of Fish and Wildlife 1993a).

The Walla Walla subbasin provides high quality black bear habitat and sustains a relatively large black bear population. Bear distribution is widespread from the forested summits, through the riparian areas, and downslope to the dryland wheat fields of the foothills. Bear densities in and around the subbasin have been estimated at 0.3 bears per square mile (Oregon Department of Fish and Wildlife 1993a). In the fall, bears concentrate to feed in the subbasin's numerous blackberry patches, old orchards, and Hawthorn thickets. This habit has resulted in a high rate of black bear harvest in the subbasin compared to nearby areas (Washington Department of Fish and Wildlife 2000c). In the Blue Mountains of Washington, bears are harvested from September-November

(Washington Department of Fish and Wildlife 2000c). The Oregon bear harvest includes both spring (April-May) and fall (August-November) seasons.

Migratory Game Birds

Numerous migratory game bird species are common in the subbasin including mourning dove, common snipe, ducks, mergansers, coots, and geese. Mourning dove and snipe populations in the region are considered stable while waterfowl populations have experienced a significant increase (Oregon Department of Fish and Wildlife, 1999).

Waterfowl population increases have been attributed to the increase in habitat as a result of the advent of irrigated agricultural practices following the construction of the John Day and McNary hydroelectric facilities. More recently the increasing popularity of corn as a crop in the subbasin has increased the food available to waterfowl. The Umatilla National Wildlife Refuge is estimated to support between 200,000-460,000 waterfowl each winter. As waterfowl populations in the Walla Walla subbasin have increased, those in neighboring areas including the Hanford reach and the Northern Columbia basin have declined (Lloyd et al. 1983). In an attempt to redistribute waterfowl populations in the subbasin wildlife managers have increased the area where waterfowl hunting is permitted in the subbasin.

Upland Galliformes

Forest Grouse

Ruffed grouse, blue grouse, and spruce grouse are native galliformes that inhabit forested areas in the subbasin. Surveys indicate annual variations in harvest numbers for ruffed grouse and blue grouse (Oregon Department of Fish and Wildlife 1999). Analysis of grouse wings collected from hunters (1980 to present) documented timing and variations for mean hatch date, hatching range, and sex/age ratios in the harvest (Crawford and Coggins 2000). Ruffed grouse are closely associated with riparian areas throughout the entire year. Blue grouse breed in open foothills and are closely associated with streams, springs, and meadows. Much of the food they require comes from the succulent vegetation or insects in these areas. During spring and summer, blue grouse use stream bottoms and areas with gentle slopes. In the fall they migrate to higher elevations where they spend the winter feeding on fir needles. Large fir trees are a food source for wintering blue grouse and are required for roost sites. Blue grouse exhibit strong site fidelity to their wintering areas in true fir (*Abies spp*.) and Douglas fir (*Pseudotsuga menziesii*) forests (Larsen and Nordstrom 1999).

Mountain Quail

Mountain quail are uncommon game birds in the subbasin. Populations in the region are thought to have declined in recent years largely from declining habitat quality. Because of their secretive nature and reliance on brushy habitats that are usually associated with riparian zones, they are not capable of extensive movements away from suitable patches of habitat. Once these habitats are degraded or removed, mountain quail become isolated from other habitat that may be available (Larsen and Nordstrom 1999).

Introduced Galliformes

Wild turkey, ring-necked pheasant, California quail, chukar partridge, and Hungarian partridge are species that have been introduced to the Walla Walla subbasin to provide recreational activities. These species are popular game species that have effectively naturalized in the Walla Walla subbasin, and wildlife managers in the basin work to maintain their populations. The industrialization of agricultural practices and the reduction in cheatgrass prominence due to yellow star thistle invasion has reduced the subbasin's suitability for these species and their populations over the last two decades (Washington Department of Fish and Wildlife 2000c; Oregon Department of Fish and Wildlife 1999).

The ringneck pheasant is the primary upland game bird species in southeast Washington. The annual pheasant harvest peaked in the subbasin during 1980s at nearly 36,000 birds. By 1999, the pheasant harvest had declined 82% to 6,554 (Washington Department of Fish and Wildlife 2000b). Factors impacting pheasant harvest include pheasant population abundance, hunter participation, and weather during the hunting season. Dramatic decline in the pheasant harvest is a direct reflection of pheasant abundance. Hunter effort increases and hunter numbers decline as pheasant populations decline. The loss of both riparian and shrubsteppe/grassland habitat has resulted in a tremendous decline in the pheasant population within the subbasin.

Extirpated Species

Sharp Tailed Grouse

Historically the Columbian sharp-tailed grouse inhabited most of eastern Oregon, including the Walla Walla subbasin. Excessive hunting in the mid to late 20th century has caused an initial reduction of Columbian sharp-tailed grouse population and range (Crawford and Coggins 2000). In 1899, L. B. Quimbly of ODFW noted that sharp-tailed grouse were declining rapidly. He ascribed the decrease in abundance to overharvest during winter and expressed the need for hunting restrictions (Crawford and Coggins 2000). Since the turn of the century, the conversion of native habitats to crop production and their degradation as a result of livestock grazing has contributed to further population declines and range reduction (Hays et al. 1998). In response to continuing declines in sharp-tailed grouse populations, Oregon hunting season closed in 1929 and never reopened. Columbian sharp-tailed grouse were extirpated from Oregon in the 1960s. The only population of sharp-tailed grouse currently in Oregon was reintroduced to Wallowa County in 1990 (Crawford and Coggins 2000). Due to improved grazing and programs like CRP, habitat for sharp-tailed grouse in the subbasin has improved since extirpation. The Walla Walla subbasin is being considered as a potential site for additional sharp-tailed grouse reintroduction efforts (Mark Kirsch, ODFW, January 2001).

Gray Wolf

Currently, the gray wolf is not known to occur in the Walla Walla subbasin. The wolf was extirpated from the region by the early 1900s. Potential wolf habitat occurs in the forested lands of the subbasin and it is generally assumed wolves will soon reoccupy the area. Successful reintroduction and management programs in Idaho and Montana have increased wolf populations in the northern Rocky Mountains, allowing wolves to disperse and potentially propagate in Oregon and Washington. Wolves have recently been observed in neighboring areas, although most of these animals are probably wolf-dog hybrids (Mark Kirsch, ODFW, January 2001). The wolf is a habitat generalist that inhabits a variety of plant communities typically containing a mix of forested and open areas with good ungulate populations. Wolves prefer areas with few roads, generally avoiding areas with a road density greater than one mile per square mile (Charles Gobar, USFS, January 2001).

Bighorn Sheep

Bighorn sheep were native to the Walla Walla subbasin but were extirpated in the 1920s (U. S. Forest Service 1990). Over-hunting, unregulated domestic livestock grazing, and parasites and disease carried by domestic livestock are all considered factors in the extirpation of bighorn sheep. California bighorn sheep were introduced to the Tucannon subbasin which borders the Washington section of the Walla Walla during the 1960s. Rocky Mountain bighorn sheep were reintroduced to the Wenaha River drainage in 1983, which borders the Oregon section of the Walla Walla subbasin on the east. The Walla Walla subbasin contains suitable habitat for bighorn sheep and the South Fork Walla Walla has been identified as a potential transplant site. The site is currently unsuitable as a transplant effort due to the domestic sheep populations in the area. Domestic sheep carry bacterial pneumonia (*Pasturella*), which is easily transferred to and fatal for bighorn sheep. At this time, bighorn sheep that occasionally wander into the subbasin are destroyed by wildlife managers to prevent the potential spread of disease (Oregon Department of Fish and Wildlife 1992b).

Habitat Areas and Quality

Fish

Current aquatic habitat in the Walla Walla subbasin has been shaped through natural disturbance and human land use. Road building and maintenance, urban and rural development, agriculture, grazing, logging, flood control and other activities have combined to alter vegetation, flow regimes, disturbance regimes such as fires and floods and other basic processes that shape the aquatic system. Habitat alterations have often resulted in negative fish and wildlife habitat impacts due to lack of enforcement of environmental regulatory requirements. Examples of regulations include Section 404 Fill and Removal permits, water quality standards, local land use planning and ESA take prohibitions. Changes to watershed processes have yielded a mosaic of aquatic habitat ranging from high quality to severely degraded.

In the Washington portion of the subbasin, key fish species are generally restricted to habitats occurring in the upper Touchet, Coppei, and Mill Creek watersheds. In Oregon, these species are most closely associated with habitats occurring in the mainstem Walla Walla above Milton-Freewater, the North and South Forks Walla Walla and in the upper Mill Creek watershed. Habitat degradation resulting from streamflow modification, excessive stream temperatures, channel modification and high sedimentation has reduced habitat availability.

Washington Habitat Quality

During the summer of 2000, a coarse-scale assessment of stream habitat was conducted in the Washington portions of the Walla Walla subbasin (Washington Resource Inventory Area [WRIA] 32; Kuttel 2000). (See Appendix C for reach descriptions.) Categorical data were collected, rating habitat variables from poor to good (Appendix D). Ratings were based on standards set by USFWS, NMFS, and by a local technical advisory group consisting of federal, and state biologists. Results from the inventory are presented in Appendix E (Kuttel 2000).

The highest quality stream habitat in the Washington portion of the subbasin occurs in areas containing adequate riparian vegetation, sufficient streamflow, diverse habitat types, and high water quality. These areas are typically located in the upper portions of the Touchet and in the Mill Creek subwatersheds. These areas are not pristine, but of comparatively higher quality than other habitat in the subbasin.

Overall, habitat quality in the upper Touchet supports a variety of key fish species throughout many life history stages. Streams that currently support multiple salmonid life stages include the North, South, Wolf, and Robinson Forks, Spangler, Lewis, Coates, and Whitney Creeks and associated tributaries (Kuttel 2000). The number of pieces of instream large woody debris throughout the upper Touchet is limited (Kuttel 2000). The lack of in-channel wood has contributed to the lack of pool habitat. Riparian condition throughout much of the upper portions of the Touchet is rated as fair to good (Northrop 1998a, 1998b). Sediment may be an issue in some areas, especially in portions of the Wolf Fork, Robinson Fork and South Fork, but overall is not a primary limiting factor to habitat quality.

Habitat quality and quantity in the upper Mill Creek subwatershed is sufficient to support relatively strong populations of summer steelhead and bull trout. Much of the drainage is protected by the Mill Creek watershed, which serves as the municipal water supply for the city of Walla Walla (Kuttel 2000).

Fair and poor quality habitat exists throughout much of the Walla Walla subbasin. Habitat rated as fair is that which supports certain species at certain life stages, but due to various limitations cannot support all life stages. The most degraded habitat identified during the inventory was that occurring in the South Fork Touchet from Griffen Fork to the mouth (e.g., Kuttel 2000). Comparative analyses of subbasin areas indicate the poorest habitat occurs throughout the Lower Walla Walla subbasin while the highest quality habitat occurs in the upper reaches of the North Fork and Wolf Fork Touchet, Lower and Upper Walla Walla, and Upper Mill (e.g., Kuttel 2000).

Oregon Habitat Quality

The relative condition of salmonid and lamprey habitat in the Oregon portion of the Walla Walla subbasin is shown in Table 22. The Oregon portion of the Walla Walla River Basin comprises approximately 27% of the total. Similar to the Washington side of the subbasin, the habitat of highest quality is found in protected headwater areas. Published Oregon habitat inventories currently represent a data gap.

Ten habitat features were ranked in Table 22 for eight stream reaches using excellent, good, fair, poor and unknown. A rating of excellent denotes that the habitat feature in that reach is of high quality and protection of these areas is critical to the long-term viability of salmonids. Habitat features that are pristine or nearly pristine are stronghold areas that are key to the survival and recovery of salmonids. These areas should be protected from further impacts.

Features given a good rating indicate that the feature is suitable for salmonid production but that some improvements are needed. For example, the South Fork of the Walla Walla River downstream of Harris Park has excellent flow and water quality, but channelization and rural development on the flood plain has reduced its overall quality. These areas remain important salmonid producing areas and modest efforts may bring considerable improvements.

A fair ranking denotes features of a given area that need more extensive rehabilitation but are not so problematic to prevent salmonid utilization of the reach. Moderate but more substantial improvements in these reaches are needed to make significant gains for salmonid recovery.

A poor ranking denotes conditions that are harsh and unsuitable for salmonids such as passage barriers, dewatering, concrete channelization, excessive water temperatures etc. When poor habitat conditions exist in lower basin migratory corridors, instream improvement can be critical for anadromous species rearing in quality habitat upstream. While rehabilitation may be more extensive for these reaches, it may be necessary if the pristine areas upstream are to be utilized.

Features given an unknown ranking denote that more examination is required to assess the particular feature in the given reach.

Table 22. General characterization of salmonid and lamprey habitat in the Oregon portion of the Walla Walla subbasin and Mill Creek, Washington (G. James, CTUIR, February, 2001)

Stream Reach	Flow	Temp.	Water Quality (chem.)	Passage Condition	Channel Conditions	Instream Habitat Diversity	Substrate Quality (sed.)	Riparian Condition	Comments
SF WW (abv. Harris Park)	E	E	E	E	E	E	E	E	Pristine stronghold, protect
SF WW (bel. Harris Park)	E	G	E	G	F	F	G	F	High water quality, some channelization, rural development
NF WW (USFS)	G	E	E	E	E	E	E	E	Stronghold, protect
NF WW below USFS	F	F	U	G	P	F	F	F	Flow, temperature, channelization concerns, rural development
Couse Creek	P	P	U	P	P	P	F	P	Logging, grazing, low flows and rural development
Pine Creek	P	P	U	P	P	F	F	P	Logging, grazing, low flows and rural development
Upp. MS WW R. (forks to LWW div.)	E	E	U	F	F	F	G	F	High water quality, channelization with rural development
MS WW R. (LWW div. to McDonald Rd.)	P	P	U	P	P	P	G	P	Severe channel and flow issues
Mill Creek (source to city water intake)	E	E	E	E	E	E	E	E	Pristine closed watershed, stronghold, protect
Mill Creek (water intake to state line)	F	G	E	F	F	F	G	G	Flow extraction and passage problems at city intake, rural development

Ratings: E = Excellent; G = Good; F = Fair; P = Poor; U = Unknown

Habitat Stronghold Areas

Although much of the salmonid habitat in the Walla Walla subbasin does not support all species during all life history phases, there are areas in the subbasin considered the most pristine in the entire Columbia plateau province. In Oregon the South Fork of the Walla Walla, North Fork of the Walla Walla above the Forest Service boundary, and Mill Creek above the city water intake are defined as unspoiled habitat capable of supporting stronghold fish populations (G. James, CTUIR, personal communication, February 2001). In the Washington portion of the Walla Walla, the Wolf Fork above Robinson Creek and the North Fork of the Touchet above its confluence with the Wolf Fork are classified as high quality salmonid habitat, as is the upper portions of Mill Creek.

Factors Contributing to Reduced Habitat Quality

Streamflow

Seasonal flow limitations in the Walla Walla subbasin limit available salmonid habitat during certain times of the year. Impoundments, diversions, and flood control efforts have significantly modified channel depth and flow in the subbasin. Morphological and hydrological changes to the subbasin also occurred as a result of intensive agricultural practices. Irrigation withdrawals frequently result in dewatering of channels and/or reductions in depth.

Low streamflow conditions may limit fish use and movement at several key points in the subbasin. One of the most important of these sites is near the Oregon-Washington border downstream of the Nursery Bridge grade control structure near the city of Milton-Freewater. A combination of factors leads to the seasonal dewatering of the Walla Walla River beginning between May and early July and lasting until the end of irrigation season in late September (Confederated Tribes of the Umatilla Indian Reservation 1990; U. S. Bureau of Reclamation 1999). This section of stream is naturally a large depositional area for flood gravel (Russell 1897) and lacks heavy subsoil to slow hydrologic conductivity (Nielson 1950). This combination was thought to create an area where the river naturally loses surface water to the gravel aquifer (Van Cleve and Ting 1960). It should be noted however, that other historical journals report year-round flows to Whitman Mission (Farnham 1839). And prior to widespread irrigation, USGS flow records from 1903-1905 show minimum monthly flow averages at 97 cfs at Milton-Freewater. The current irrigation withdrawals aggravate the natural condition and ensure the channel goes dry downstream of the Nursery Bridge Dam. Currently the dewatered section is between three and six miles in length (U. S. Bureau of Reclamation 1999). Channel condition in this area is associated with long term channel disturbance, including gravel mining and channelization for flood control. Even as late as September 29 in 1998, a one-half mile section was still dry (Mendel et al. 1999).

The seasonal flow reduction impacts the life cycle of all identified key salmonid species upstream of Milton-Freewater. This flow reduction narrows the window of migration into the watershed by chinook salmon and indigenous steelhead, routinely strands bull trout on their migration upstream from wintering areas in the lower watershed, and reduces or eliminates steelhead spawning and rearing areas. Personnel from the CTUIR and ODFW capture and relocate fish trapped in the plunge pool downstream of the dam and for a mile or more downstream when flows subside. Results from the 1990–1995 period show that hundreds to thousands of redband trout/steelhead and 10–30 bull trout ranging between 75 and 430 mm in length were salvaged (Buchanan et al. 1997).

Above the Nursery Street Bridge Diversion, about 60 diversions of various sizes remove water from the Walla Walla River and its forks throughout the year (T. Justus, OWRD, personal communication, February, 2001). The most notable diversions are the Little Walla Walla Diversion and Milton Ditch. During the 1890s, the Walla Walla River was a braided system through the Milton-Freewater area. During the last decade of the 19th century and first decade of the 20th century most of these braided channels were consolidated into the Little Walla Walla River which essentially became an irrigation ditch at that time, although it is still classified as a natural river (U. S. Army corps of Engineers 1997).

Robinson Creek

Summer flows drop to 1 cfs in the lower reaches of Robinson Creek, and at several points upstream the creek has no surface flow (Mendel and Taylor 1981). Little data exists on the period that this channel goes dry. Fish biologists identified populations of steelhead/redband trout and bull trout in Robinson Creek (G. Mendel, WDFW, personal communication, July 1999). Low flow conditions appear to be of natural origin in this watershed, but may be a result of aggradation from increased sediment in the watershed.

South Fork Touchet River

The lower and middle portions of the South Fork Touchet River maintain very low flows during the summer months. Although flows are estimated at 1–2 cfs during low flow periods (Mendel 1987), the South Fork maintains populations of steelhead/redband trout and bull trout.

Lower Patit Creek

During the summer, Patit Creek generally maintains flows in its upstream portions and goes subsurface in downstream portions (G. Mendel, WDFW, personal communication, April 1999). Patit Creek contains a steelhead/redband trout population.

Touchet River Downstream of Dayton

The Touchet River downstream of Dayton was identified as depth/velocity limited due to high gradients, extensive riffles, and braided channels (Hunter and Cropp 1975). This stream section is currently used by steelhead and occasionally by spring chinook (believed to be strays).

Lower Reaches of the Touchet River

The first four miles of the Touchet River is another important area with extremely low flows that is usually completely dewatered during irrigation season (Confederated Tribes of the Umatilla Indian Reservation 1990; U. S. Army Corps of Engineers 1997; Mendel et al. 1999). The Touchet irrigation dam at RM 5 removes the entire streamflow during dry months—a 30 cfs water right (Van Cleve and Ting 1960). Although low flow conditions in the Touchet River vary from year to year, it is generally dry from the end of August into

October. It is not likely that this period of no flow is critical to any of the key species, although insufficient flows may have negative ecological impacts to other biota.

Dry Creek

Dry Creek north of the city of Walla Walla has limited flows during the summer months but contains a population of steelhead/redband trout in its upper reaches.

Lower Reaches of Mill Creek

Flows in Mill Creek, below Yellowhawk Diversion Dam, annually reach near zero levels as a result of seepage loss (James et al. 1991) and water diversions into Yellowhawk and Garrison Creeks (Ebasco Services and S. P. Cramer and Associates 1992).   Flow data from USGS gauge 14015000 at the Yellowhawk Diversion recorded 140 zero flow days in 1992 (Hallock and Ehinger 1995). This diversion of water occurs both to satisfy existing senior water rights and maintain flows for fish in Yellowhawk and Garrison Creeks. There is insufficient water to maintain flows in all three streams (Yellowhawk, Garrison and Mill Creek) during the summer low-flow period. Spring discharge and irrigation return flows maintain minimum flows in the bottom five miles of Mill Creek from Walla Walla to its confluence with the Walla Walla River (Northrop 1998a, 1998b). Sewage treatment water is released into Mill Creek during the non-growing season and diverted into the Blalock and Gose irrigation districts during the growing season (Hoyle-Dodson 1997).

Walla Walla River Downstream of Mill Creek

The U. S. Army Corps of Engineers (1997) identified the Walla Walla River downstream of Mill Creek as having minimal water and unsuitable habitat for salmonids. Streamflow reduction of the Walla Walla River to a series of pools just upstream of the Touchet confluence was observed in August through October of 1998 (Mendel et al. 1999). Habitat in this reach is used seasonally by steelhead/redband trout.

Couse Creek

This small tributary to the mainstem Walla Walla River is located just upstream of the city of Milton-Freewater, Oregon. Much of the stream channel is confined and incised as a result of past and present residential development and farm/pasture activities. Riparian habitat is generally in poor condition although some relic reaches still exist. Flows are ephemeral throughout the summer months with pocket water sections providing adequate habitat for salmonid fish in some reaches. CTUIR found two bull trout in this stream in 1999, and many redband/steelhead. An irrigation push-up dam near the mouth of the stream eliminates passage during portions of the year. This problem will be addressed as part of an ongoing BPA juvenile/adult passage effort in 2001-2002.

North Fork Walla Walla

The publicly owned headwaters of this stream begin in steep timbered canyons (managed by the Forest Service) before eventually flowing into a much broader valley predominated by privately owned residential homes, pastures and orchards. Riparian habitat is considered excellent in those portions of the stream above the Forest Service boundary. Below this point, riparian conditions are impacted severely by past and present land-use activities. Irrigation withdrawals and resultant passage problems are a concern in some areas. Most of these problems are currently being discussed by the local Watershed Council, Oregon Water Resources, and others. Stream temperatures are marginal for salmonid fish particularly in those portions of the stream below the Forest boundary. Despite these conditions the stream provides critical spawning and rearing habitat for summer steelhead/redband and bull trout.

Temperature

High stream temperatures during the summer months currently impairs or prevents salmonids from migrating through or rearing in the lower reaches of many tributaries as well as the mainstem of the Walla Walla River below Milton-Freewater (Buchanan et al. 1997; Mendel and Taylor 1981; CTUIR unpublished data). Water temperatures are currently monitored hourly at more than 30 locations throughout the basin with calibrated automated recording units. WDFW and CTUIR recorded water temperatures from 24 to 29°C in the lower reaches of the Touchet, Walla Walla, Yellowhawk Creek, Mill Creek, and Coppei Creek. These high temperatures are in the range reported to be lethal for salmonids (Bjornn and Reisser 1991). Seasonally high air temperatures, low flows, lack of shade, and altered groundwater hydrology and hyporheic flows contribute to the unsuitable thermal conditions.

CTUIR and the USFS have documented excellent summer water temperature profiles in the upper mainstem of the Walla Walla River and in many headwater tributaries. For example, water temperatures do not exceed 20°C in the mainstem Walla Walla River at Milton-Freewater and bull trout rear there throughout the summer (CTUIR 2000). Water temperature profiles improve farther upstream as documented by the USFS in the South Fork where maximum water temperatures did not exceed 13°C (RM 9).

While most salmonid migrations do not occur in the summer, high water temperatures can impede anadromous and fluvial salmonid migrations. This is a primary concern with bull trout as they begin moving into the headwater spawning areas in early August. Warm water at the mouths of tributaries can impact their spawning migrations and affect the movements of other salmonids as well. For example, in the North Fork Walla Walla, maximum water temperatures are 22°C at the mouth and 18°C and the USFS boundary. This contrasts sharply with the South Fork where maximum water temperatures are 18°C at the mouth and 13°C at the USFS boundary (CTUIR and USFS unpublished data).

WDFW has documented mean water temperatures exceeding 24°C for more than four consecutive days in the Walla Walla River from the Oregon border downstream and in the Touchet River from the mouth up to Coppei Creek. The Touchet River from Coppei Creek upstream to Lewis and Clark State Park was also identified as temperature-limited due to spot temperature readings greater than 25.6°C (Appendices F-I).

Mendel et al. (1999) noted that no salmonids were observed in the Touchet or Walla Walla Rivers when mean stream temperatures exceeded 21.6°C and 21.7°C, respectively (Table 23). The population of salmonids in the Touchet River decreased by half when mean water temperatures reached 18.7°C, then halved again at 20.6°C. Given that they reported mean temperatures suggests that maximum water temperatures likely approached the limits of salmonid endurance frequently during the summer. The Walla

Walla River did follow this same pattern presumably due to groundwater seeps creating small pockets of cool water.

Table 23. 1998 monthly temperature means for instream monitoring sites and mean salmonid density averaged from sites at, immediately above, and immediately below the monitor (Mendel et al. 1999).

Monthly Location	Density (#/100m^2)	Mean Temperature (°F)		
		July	August	September
Touchet River				
Dayton	23.4	67.5	65.6	60.6
State Park	11.2	74.2	69.1	65.7
Waitsburg	5.2	74.3	70.8	64.3
Lamar	0	78.0	73.9	66.8
Simms Road	0	79.2	74.4	67.3
Touchet Gun club	0	79.4	74.9	67.6
Walla Walla River				
Beet Road	0.2	72.0	69.0	66.2
Swegle Road	0.5	73.4	71.x	64.2
McDonald Road	0	76.8	74.3	69.5

Physical Passage Impediments

The number of physical (structural) barriers located within the subbasin has significantly limited habitat for key fish species. The U. S. Army Corps of Engineers (1997) identified 61 structures in the Walla Walla subbasin which provide some level of impediment for fish passage. Many more exist in smaller tributaries or were not identified in the report. These structures are primarily associated with water diversions. Diversion dams can prevent or delay migration of adult fish and diversion canals can entrain juvenile fish into off channel areas. Attempts to alleviate these passage concerns began in 1997 with the removal of Marie Dorian Dam, located on the upper mainstem Walla Walla River above the town of Milton-Freewater. Since that time, Maiden Dam on the lower Touchet River has also been removed and the ladder at Burlingame Dam has been reconstructed. A new ladder is under construction at Nursery Bridge Dam in the town of Milton-Freewater to replace the existing ladder, which is in disrepair and inadequately designed. Other adult passage impediments have been identified in the basin, most notably at Hofer Dam on the lower Touchet River and a number of structures on Mill Creek.

Juvenile passage impediments are far more numerous and widespread in the basin. New fish screen systems have been constructed at Burlingame Canal and the Little Walla Walla River, the two largest diversions in the subbasin. New or upgraded screens have been installed at a number of smaller diversions, primarily in Oregon. Three other screening projects are currently being implemented are a new screening system for the city of Walla Walla water supply intake on Mill Creek, and two ditch consolidation projects. These ditch consolidation efforts will eliminate the Garden City gravity diversion from the mid-mainstem area of the Walla Walla River and Milton Ditch, which is located above Milton-Freewater at the confluence of Couse Creek and the Walla Walla River. Most of the remaining diversions in the subbasin have screen systems that are either in disrepair, do not meet current NMFS screening criteria, or are unscreened. Only major diversions have been identified for future screening improvements.

Channel Modifications

Like many rivers in the Northwest, the Walla Walla River was controlled to accommodate land use by Euro-American settlers (U. S. Army Corps of Engineers 1997). Dikes and levees, channelization, and bank stabilization are all common in the Walla Walla subbasin and have led to a profound change in the hydrology of the river system and to a loss in fish habitat.

Land use practices in the watershed have also significantly impacted the hydrology, channel morphology, and habitat quality. For example, the channels in the South Fork Touchet River and Wolf Fork have become wider, and more braided, consistent with an aggraded system. The source for the increased sediment has come from an increased incidence of debris flows in small steep tributaries and from stream bank erosion. The cause of the changes can be traced to land use activities such as agriculture, roading, and urbanization that restrict the natural dynamics of the stream. The mainstem channels are sensitive to high flows and flooding events likely accelerate channel changes (Washington Department of Natural Resources 1998).

Although no historic quantitative physical stream data exists for the Walla Walla subbasin, it is understood that the disruption of the natural geomorphologic processes in the mainstem Walla Walla and Touchet River channels has impacted aquatic habitat by causing 1) the channel to be less sinuous and the gradient steeper, 2) a higher width to depth ratio, 3) less pool habitat and more run habitat, and 4) smaller mean sediment particle size with a substantially higher proportion of sand, silt, and associated cobble embeddedness (U. S. Army Corps of Engineers 1997).

Walla Walla River Through Milton-Freewater, Oregon

The USACE's Walla Walla River Flood Control Project modified the channel of the Walla Walla River through the city of Milton-Freewater, Oregon. Completed in 1952, this project consists of seven miles of channel "improvements." The project includes 18.53 miles of revetted levee, 7.06 miles of channel rectification, drainage, and irrigation structures, one rock diversion sill, five concrete diversion sills, and eight rock channel stabilizer sills, concrete floodwalls, and bridge abutment wing walls (U. S. Army Corps of Engineers 1951). "Channel rectification" in this project refers to the removal of all debris, bars, and islands, widening and straightening of the riverbed, and shaping the gradient of the river bottom. The USACE's channel-widening project on the Walla Walla River near Milton-Freewater has altered the river so that flows of 100 cfs are now required for adult steelhead passage through the project (Oregon State Game Commission 1963). The levees and a grade control structure contributed to channel incision of about 10 feet through this reach.

Mill Creek Through Walla Walla, Washington

"Modifications" to Mill Creek by local interests are extensive, including channel maintenance, bank protection, and construction of concrete channel walls through Walla

Walla (U. S. Army Corps of Engineers 1964). Construction of these walls began in 1909 and was completed in 1933. The USACE constructed the Mill Creek project in 1942, which diverts floodwaters exceeding 5,900 cfs to the 6,000 acre-feet Mill Creek Reservoir. One-half mile downstream, the flow from Mill, Garrison, and Yellowhawk Creeks is cut off so that Mill Creek flow is reduced to 5,400 cfs. The channel is paved through the city of Walla Walla.

Touchet River Through Dayton, Washington

The USACE completed construction of flood control levees through Dayton, Washington in February 1965 (U. S. Army Corps of Engineers 1997).

Touchet River Through Waitsburg, Washington

Flood control levees were constructed through the city of Waitsburg, Washington in February of 1951 (U. S. Army Corps of Engineers 1997).

Lower Dry Creek

Lower Dry Creek was channelized in June of 1961 for flood control near Lowden, Washington (U. S. Army Corps of Engineers 1997). This project consisted of channel modifications from the confluence with the Walla Walla River to a point approximately 6.4 miles upstream (U. S. Army Corps of Engineers 1969). Sediment discharge from this system is known to be of significant concern.

Sedimentation

Over the last 135 years, agricultural-related changes to vegetative cover in the Walla Walla subbasin have caused a dramatic loss of topsoil, reduced infiltration, lowered water retention capabilities, and increased runoff (U. S. Army Corps of Engineers 1997). Fine sediment delivered to the channel has been identified as one of the primary limiting factors to aquatic habitat in the Touchet River, with agriculture targeted as a principal source of pollution to surface and groundwater through sediment and chemical loading. A study done by the Pacific Groundwater Group (1995) cited agricultural activity in the subbasin as the leading cause of soil erosion and sediment production. During the period of July 1962 to June 1965, the Touchet River and Dry Creek contributed about 80% of the total sediment discharged from the Walla Walla subbasin (Mapes 1969). The estimated erosion rate from the agricultural areas drained by the Touchet River and Dry Creek exceeded 4,000 tons per square mile (Mapes 1969). Conservation practices have been successful in reducing sediment produced from farmed lands in recent years, but further improvements are needed.

High quality habitat for cold water biota is currently limited to headwater reaches, many of which are being degraded by fine sediment production via forest practices and grazing. Based on the current level of forest practices, the WDNR estimated that management-related surface erosion increased sediment delivery over reference rates by 35, 65, 309, and 52% in the subwatersheds of the upper South Fork, lower South Fork, Robinson Creek, and Wolf Creek, respectively (Washington Department of Natural Resources 1998). Furthermore, over 25% of the skid trail network within the South and Fork of the Touchet River and Wolf Fork occurs within 200 feet of stream channels, making it a likely source of fine sediment to Type 1–5 streams (Washington Department of Natural Resources 1998).

Vegetation Removal/Modification

Alterations to lowland and upland vegetation have considerably altered flow regimes throughout the Walla Walla subbasin, making it largely event-dominated. In the Blue Mountain province, precipitation events such as thunderstorms and rain-on-snow events accelerate sediment movement from croplands, grazing lands, forested areas, or intermittent channels to mainstem reaches. These high flow events create sediment pulses that generally move during flooding and travel slowly through the river system. Storm events are detrimental to streams in the lowland province as well, so that intermittent creeks can rapidly rise to flood stage and deliver large amounts of sediment to the larger channels in a short time period. This event-dominated hydrograph is common in the region, but the impacts to the smaller, mainstem tributaries are currently unknown.

Modifications of the vegetative community through land use practices have further reduced the quantity and quality of anadromous and resident salmonid habitat in the Walla Walla subbasin. For example, the riparian areas and surrounding floodplains, which once provided flood storage and sources of organic material, have been greatly reduced or replaced by farmland (Cleveland et al. 1975; Mudd 1975; U. S. Army Corps of Engineers 1997). Recruitment of large woody debris to the channel has been largely eliminated following conversion from riparian to cropland. According to a 1975 wildlife survey, only 37% of the historical riparian zone along the Touchet River contained natural riparian vegetation (U. S. Army Corps of Engineers 1997). Findings also indicated that 37.6% of the existing riparian vegetation does not provide sufficient shading for stream temperature amelioration.

Instream Habitat Diversity

Indirectly, many of the characteristics and impacts defining a diverse stream channel have been described in previous sections. Diversity within a stream channel is generally understood to include things such as stream meander, the presence of large woody debris, and frequent change in habitat type (pool, riffles, glides, undercut banks, etc.). Valley type, stream gradient, upstream and on-site land-use, soil conditions, substrate size, floodplain function, and riparian corridor width may all impact the presence or absence of stream diversity. Contrary to popular belief, diverse stream channels are often the most stable during high flow events, acting as biological sponges of sediment and out-of-bank water. Stream meander increases stream length, elevating rearing capacity and slowing water velocities and resultant bank erosion and sediment input. Meander promotes bank storage of water leading to diverse and abundant growth of riparian vegetation. Large woody debris and organic material recruited from vegetated corridors provides holding areas for adult fish, concealment for juveniles, and a constant source of food for macroinvertebrates.

Land use activities, particularly agriculture, have severely limited the ability of stream channels in the basin to maintain even moderate diversity. Diversity is excellent only in headwater areas. Many streams in the mid to lower portions of the basin have been confined, straightened, and cleared of all riparian vegetation in an effort to maximize farming and residential potential. When large wood does enter the channel, its most-often removed by private landowners fearing it will lead to bank erosion or debris jam at streams crossings. Channel forming flow regimes have changed as a result of basin-wide irrigation and stream meander is often prevented with the construction of rock barbs and dikes.

In recent years, changes resulting from stewardship education and imposition of federal law have encouraged positive farm conservation practices, county zoning, and state permitting. It is expected that with further education, funding, and conservation, many of the past activities impacting streams will be reduced or eliminated.

Water Quality

The chemical constituents of many streams and rivers in the Walla Walla subbasin limit habitat uuse by key fish species. Poor water quality from organic and inorganic chemical additions and/or reactions has been documented in several stream reaches, but has not been examined on a basin-wide scale. The lack of a comprehensive water quality monitoring program currently represents a data gap in the Walla Walla subbasin.

Habitat-limiting water quality (chemical) problems in the subbasin most often occur near urban areas, streamside areas where pesticides or herbicides are applied, or areas of high grazing intensity. The change from rural to urban areas, especially near the city of Walla Walla, has contributed to elevated pH levels, excessive levels of fecal coliform bacteria, and high concentrations of pesticides and nutrients. Chlorine problems have been documented in Mill Creek near Gose Street, a likely result of effluent and/or water treatment processes.

Evidence of sewage pollution has been documented in both the Touchet and Walla Walla Rivers. Fecal coliform bacteria has impacted instream habitat in the lower portion of the Walla Walla (RM 15.3) on several occasions, and has exceeded state standards three times in the Touchet (RM 0.5).

Pesticides have also degraded instream habitat in the lower reaches of the Walla Walla River (below the Touchet confluence). Some of the pesticides documented in this portion of the subbasin are highly toxic to fish species, such as the chlorinated organics DDT, DDE, chlordane, and dieldrin, all of which were banned by the EPA on the grounds that they are carcinogenic (Laws 1993; Davis et al. 1995).

Wildlife

Forest

Approximately 21% of the subbasin consists of forested habitat (Figure 7). The remaining area (79%) historically consisted of shrubland and grassland habitats, but currently is agriculture land with interspersed shrublands. Forested habitat occurs primarily in the eastern portion of the subbasin at mid and high elevations (Figure 7). In the lower elevations forested habitat is generally limited to pine stringers along streams. The three primary forest vegetative groups are identified below as well as key habitat components.

Dry Forest

The dry forest group occurs predominately at the mid- and lower elevations and on southerly aspects in the forested zone. Dry forest types are generally limited by low water availability and are often subject to drought. This group primarily consists of ponderosa pine as the cover type, but Douglas fir is also common at the upper elevations and moister sites.

Timber harvest and fire suppression have reduced the prevalence of the dry forest group in the region (Quigley and Arbelbide 1997a). Since ponderosa pine is a valuable timber species, large mature stands were among the first to be harvested after European settlement (U. S. Forest Service 1990). Fire suppression further reduced the extent of ponderosa pine in the subbasin. The thick bark of ponderosa pine allows it to withstand ground fires better than the thin-barked true firs, giving it an advantage in areas with a short fire return interval**.** Fire suppression has allowed the shade-tolerant fir species time to establish in the understory of ponderosa pine forest. Fir will eventually become dominant when the canopy becomes dense enough that the shade-intolerant ponderosa pine seedlings cannot survive (Johnson 1994). Flammulated owls are one of the many species dependent on mature ponderosa pine forests. Populations of this species have declined with the ponderosa pine forests of the subbasin.

Moist Forest

The moist forest group occurs primarily at mid to upper elevations and on all aspects in transitional areas between drier, lower elevation forests and higher elevation colder forests. This group primarily consists of grand fir and mixed conifer cover types. Mixed conifer types can include a variety of species such as grand fir, Englemann spruce (*Picea engelmannii*), lodgepole pine (*Pinus contorta*), Douglas fir, western larch (*Larix oddidentalis*), and ponderosa pine. Some of the dry forest cover types occur in the moist forest group as well.

The extent of mixed conifer forests in the Blue Mountains has increased since European settlement, primarily due to their establishment in areas dominated by seral ponderosa pine under natural fire return intervals (Quigley and Arbelbide 1997a). These forests are comprised primarily of Douglas fir and grand fir but also include western larch, Englemann spruce, and sub-alpine fir (*Abis lasicocarpa*; Clarke and Bryce 1997). The expansion of this cover type has not resulted in healthy populations of all wildlife species dependent on it. Fire-suppression and even-aged timber harvest has resulted in dense multi-storied forests of uniform age. These stands exhibit a higher degree of susceptibility to forest insects and disease and low suitability to species like the MacGillivray's warbler that prospers in uneven canopied forests (Johnson 1994; Csuti et al. 1997). Timber harvest has reduced the prevalence of mature forest types in the region, and in conjunction with fire suppression, the prevalence of snags and wood debris (Quigley and Arbelbide 1997a; U. S. Forest Service 1990). These changes have likely contributed to population declines in many cavity nesting bird species including the vaux swift which nests in large hollow trees and the marten which uses downed logs for cover and as access points for hunting below snow (Csuti et al. 1997).

Cold Forest

The cold forest group occurs at the highest elevations and/or on north facing slopes. Cold forests are generally limited by a short growing season and by low moisture availability on some sites. This group consists of spruce fir cover types including sub-alpine fir, Englemann spruce, and lodgepole pine. There is some overlap in species composition between the cold forest types and the moist forest group. Due to the remote location of the cold forest habitat type there has been essentially no loss to agricultural or urban development in the subbasin. Fire suppression has resulted in a significant increase in the extent of mid-seral shade tolerant species in this forest group (Quigley and Arbelbide 1997a).

Aspen

Aspen can occur within all three of the forest vegetative groups previously mentioned. In the Walla Walla subbasin, aspen occur as small remnant stands widely scatted across the area. Aspen is generally associated with wet or moist sites, including seeps, meadows, and streams. Aspen habitats have been identified as a priority habitat by the WDFW.

Grass and Shrubland

Historically the majority of the subbasin was covered primarily by shrubsteppe and grassland ecosystems. In the drier western sections of the subbasin big sagebrush (*Artemesia tridentata*), bluebunch wheatgrass (*Agropyron spiciatum*) and *Poa sandbergi* were the dominant vegetation types. The eastern lowlands of the subbasin receive more precipitation and were historically dominated by Idaho fescue (*Festuca Idahoensis*) (Clarke and Bryce 1997).

A GIS overlay of the historic vegetation layer developed by ICBEMP with a current land use map indicates that 77% of the subbasin historically covered by native grass and shrubsteppe vegetation is now cultivated. Most of the historic grass and shrubland areas not cultivated are grazed by livestock (Figure 8), although insufficient details about the extent of grazing activities were available to quantify this disturbance. A comparison of Landsat data with the modeled historic extent of shrubsteppe habitats found that Walla Walla County’s shrubsteppe lands have declined from 777,017 to 178,037 acres (Dobler et al. 1996). Most of the remaining shrubsteppe habitats in the subbasin are small and disjunct from other remnants. Fragmentation compounds the negative effect of habitat loss on the shrubsteppe obligate species of the subbasin, as many areas are too small or isolated to support viable populations.

Most of the remnant shrubsteppe ecosystems in the subbasin occur on shallow soils or near rock outcroppings where farming is difficult. They are usually privately owned, relatively small fragments of land surrounded by agriculture (Dobler et al. 1996). These small shrubsteppe remnants are particularly prominent in the southern part of the subbasin between Athena and the Washington State line (Kagan et al. 2000) where many remnants are currently for sale.

Wetland

Wetland habitats in the subbasin are thought to have decreased in the past hundred years, but it is difficult to quantify by how much. Many wetlands in agricultural areas have been filled to increase the amount of farmable acres (Quigley and Arbelbide 1997b). Incising of stream channels due to alterations in flow and sedimentation processes has resulted in reduced availability of moisture to wet meadow vegetation and permitted invasion by more xeric vegetation (Johnson 1994). Trapping and loss of habitat have reduced beaver populations in the subbasin, subsequently reducing the number of wetlands formed by their dam-building activities (Langston 1995). The remaining wetlands in the subbasin are primarily off-channel habitats along streams (Figure 7). Species of concern associated with wetland habitats include the leopard frog, western boreal toad, and the long-billed curlew (Csuti et al. 1997).

Riparian

Riparian areas contain the most biologically diverse habitats in the subbasin because of their variety of structural features (including live and dead vegetation) and the close proximity of riparian areas to water bodies. This combination of habitat features provides a wide array of habitats for numerous terrestrial species. Common deciduous trees and shrubs in riparian areas include cottonwood, alder, willow, and red osier dogwood (U. S. Forest Service and Bureau of Land Management 2000). Riparian vegetation is used by more species than any other habitat (Quigley and Arbelbide 1997a).

Cottonwood, white alder, and willow dominate the riparian community in the lowlands (U. S. Army Corp of Engineers 1997). These species also occur in the riparian zone of the uplands, but coniferous species increase in prominence. Both the quantity and quality of riparian vegetation in the subbasin has been severally degraded. Only 37% of the Touchet River riparian zone remains in natural riparian vegetation (U. S. Army Corps of Engineers 1997). Along the Oregon portion of the Walla Walla River 70% of the existing riparian zone is in poor condition (U. S. Army Corps of Engineers 1997). The largest expanse of relatively high quality riparian habitat exists on the 600 hectare USACE-managed Wallula Habitat Management Unit located where the Walla Walla River empties into Lake Wallula behind McNary Dam (U. S. Army Corps of Engineers 1997).

Agriculture

The greatest change to the wildlife habitat in the Walla Walla subbasin since historic times has been the addition of agricultural areas. These areas support relatively limited wildlife populations, but some species thrive here. Agricultural areas support many small birds and mammals and their predators, including coyotes and red-tailed hawks (Csuti et al. 1997). Ring-necked pheasants are common in agricultural areas within the subbasin but recently their numbers have decreased (Washington Department of Fish and Wildlife 2000c). Possible explanations for this decline include a reduction in shrub and tree cover surrounding fields or the negative effects of pesticides (Larsen and Nordstrom 1999). Deer and elk feeding in agricultural lands occasionally lead to conflict between private landowners and game management agencies. Dramatically increased CRP lands in recent years have provided wildlife habitat due to planting native vegetation. A corresponding increase in deer populations in the subbasin has been attributed to this increase in available habitat (Washington Department of Fish and Wildlife 2000c).

Watershed Assessment

Watershed assessments completed for the Walla Walla subbasin include historical conditions, current habitat characterization, analysis, improvement recommendations, propagation, project monitoring results, and legal requirements. Some reports also cover

public involvement and agency interactions with regard to implementation of management plans.

Altman, B., and A. Holmes (2000a) *Conservation Strategy for Landbirds in the Columbia Plateau of Eastern Oregon and Washington.* Documents the history of habitat loss and existing conditions of habitats for landbirds in the Columbia Plateau of Oregon and Washington with restoration and conservation strategies targeting the long-term maintenance of healthy populations of native landbirds.

Altman, B., and A. Holmes (2000b) *Conservation Strategy for Landbirds in the Northern Rocky Mountains of Eastern Oregon and Washington.* Documents the history of habitat loss and existing conditions of habitats for landbirds in the Rocky Mountains of Oregon and Washington with restoration and conservation strategies targeting the long-term maintenance of healthy populations of native landbirds.

Center for Environmental Education (1999). Draft Touchet River Watershed Assessment. Prepared for the Columbia County Conservation District.
This assessment includes a subbasin overview and summarizes known information about sediment sources, channel characteristics, hydrology, water quality, and the aquatic ecosystem.

Center for Environmental Education (2000). Draft Walla Walla River Watershed Assessment. Prepared for the Confederated Tribes of the Umatilla Indian Reservation. This assessment includes a subbasin overview and assesses the aquatic ecosystem, water quantity, water quality, and habitat conditions.

Columbia River Inter-Tribal Fish Commission (1996). *Wy-Kan-Ush-Mi Wa-Kish-Wit: Spirit of the Salmon. Vol. I*. Emphasizes cultural, legal, biological, and institutional contexts and provides recommendations.

Columbia River Inter-Tribal Fish Commission (1996). *Wy-Kan-Ush-Mi Wa-Kish-Wit: Spirit of the Salmon. Vol. II: Subbasin Plans*. This plan provides specific subbasin breakdowns for fish population status/goals, problems impacting fish, ongoing actions, and recommended actions (including law enforcement, instream flow and passage, watershed management for water quality, riparian restoration, range management, forest management, mining impact reduction, and artificial production).

Confederated Tribes of the Umatilla Indian Reservation (1990). *Walla Walla River Subbasin Salmon and Steelhead Production Plan*. Pendleton: Oregon Department of Fish and Wildlife, Portland; Washington Department of Fisheries, Olympia; Washington Department of Wildlife, Olympia.
This report is one of 31 subbasin long-term plans that comprise the NWPPC's Columbia River Basin Fish and Wildlife Program for salmon and steelhead production. In addition to providing the basis for production strategies, it also documents current and potential production, summarizes agency and tribal management efforts, goals, and objectives, and identifies problems, opportunities, and strategies

Ebasco Services and S. P. Cramer and Associates (1992). *Walla Walla River Basin: Reconnaissance Level Investigations, Fisheries Enhancement Potential*. Bellevue, WA: Submitted to U. S. Army Corps of Engineers. Identifies the needs and opportunities for water resource related projects within the basin. Existing temperatures and fish production models were used to determine the incremental changes in the number of adult and juvenile steelhead and salmon

Hunter, J. W. and T. D. Cropp (1975). *Touchet River Study. Part II: Fisheries*. Bulletin No. 5. Portland: Washington Department of Game, Applied Research Section. This study documents stream discharge and temperature relationships, fish passage, conductivity, and spawning and rearing potential in terms of potential fisheries enhancement. Recommendations include 1) increasing discharge measured at Bolles to the range of 150-270 cfs for anadromous species and 130-160 cfs for resident trout, 2) fluctuating project releases at least bi-weekly during February through May to stimulate upstream migration of steelhead, 3) increasing project releases from 90 cfs in March to 110 cfs in June to provide flows more suitable for steelhead spawning, 4) ensuring the water temperature of project releases does not exceed 55˚F.

Kuttel, M. J. (2000). *Draft Salmonid Habitat Limiting Factors WRIA 32, Walla Walla Watershed*. Washington Conservation Commission. This report compiles watershed history, description, stock status of salmonids, limiting factors assessment, subbasin descriptions, recommendations, data gaps.

Leigh, C. and J. Phelps (1985). *Columbia River Basin Fish and Wildlife Program Application for Amendment*. Washington Department of Game; Oregon Department of Fish and Wildlife. This report addresses propagation in the Walla Walla River. Study-specific problems identified include low summer flows, flood damage in spring runoff, high summer water temperatures, bank erosion and sedimentation, inadequate passage, and inadequate pool to riffle ratio. Species of concern include steelhead, spring and fall chinook salmon, resident trout, small mouth bass, and potentially coho salmon.

Martin, S. W., M. A. Schuck, K. Underwood and A. T. Scholz (1992). Investigations of Bull Trout (Salvelinus Confluentus), Steelhead Trout (Oncorhynchus Mykiss), and Spring Chinook Salmon (O. Tshawytscha) Interactions in Southeast Washington Streams: 1991 Annual Report. Portland: Prepared for the Bonneville Power Administration. Project No. 90-53, Contract No. DE-BI79-91BP17758. This study assesses population dynamics, habitat utilization and preference, feeding habits, fish movement and migration, age, condition, growth, and the spawning requirements of bull trout.

Mendel, G., V. Naef and D. Karl (1999). *Assessment of Salmonid Fishes and Their Habitat Conditions in the Walla Walla River Basin: 1998 Annual Report*.: Washington Department of Fish and Wildlife, Fish Management Program. Prepared for the Bonneville Power Administration. This report determines fish passage, rearing, and spawning conditions for steelhead and chinook salmon, and assesses steelhead and bull trout distribution, densities, and genetic composition in the Walla Walla watershed. It includes habitat descriptions, fish data, temperature and flow measurements, limiting factors, and genetic population sampling.

Mendel, G., D. Karl and R. Coyle, (2000). *Assessment of Salmonid Fishes and Their Habitat Conditions in the Walla Walla River Basin: 1999 Annual Report*. Washington

Department of Fish and Wildlife, Fish Management Program. Prepared for the Bonneville Power Administration. This report etermines fish passage, rearing, and spawning conditions for steelhead and chinook salmon, and assesses steelhead and bull trout distribution, densities, and genetic composition in the Walla Walla watershed. It includes habitat descriptions, fish data, temperature and flow measurements, limiting factors, and genetic population sampling.

Mendel, G., D. Karl and R. Coyle (2001). *Draft Assessment of Salmonids and Their Habitat Conditions in the Walla Walla River Basin: 2000 Annual Report*. Washington Department of Fish and Wildlife, Fish Management Program. Prepared for the Bonneville Power Administration. Determines fish passage, rearing, and spawning conditions for steelhead and potential reintroduction for chinook salmon, assesses steelhead and bull trout distribution, densities, and genetic composition in the Walla Walla watershed. Includes habitat description, fish data, temperature and flow measurements, limiting factors, and genetic population sampling.

Mudd, D. R. (1975). Touchet River Study: Part I, Wildlife. Portland: Washington Department of Game, Applied Research Section. Study conducted under contract with the U. S. fish and Wildlife Service. This three-month wildlife study on the Touchet River determined characteristics and amounts of riparian wildlife habitat along the course of the river. Six distinct habitat types were found. A wildlife index was developed for each type and width of that type. Bird, mammal, and plant species were surveyed

Pacific Groundwater Group (1995). *Initial Watershed Assessment Water Resources Inventory Area 32: Walla Walla River Watershed*. Seattle: Prepared for Washington Department of Ecology, Spokane. Includes development of a conceptual and quantitative hydrologic understanding of the interaction between climate, surface water, and groundwater while considering existing allocations, withdrawals, water quality, and fisheries values.

Soil Conservation Service, U. S. Forest Service, and Economic Research Service (1984). *Southeast Washington: Cooperative River Basin Study*.
This study found that soil erosion is a continuous and serious problem on cropland areas. Average erosion rates are less on forest areas and rangeland than cropland. These problems can be solved by specific conservation practices.

Oregon Water Resources Department (1988). *Umatilla Basin Report.*
This report gives a natural and cultural overview of the basin and provides issues, strategies and recommendations for management. Four appendices include flow and water quality data. The purpose of the document is to provide context and recommendations for managing water resources to improve fish, wildlife and water quality goals. Issues discussed are water supply, water quality, water use, fish needs, soil conservation and watershed management.

Underwood, K. D., S. W. Martin, M. L. Schuck and A. T. Scholz (1995). *Investigations of Bull Trout (Salvelinus Confluentus), Steelhead Trout (Oncorhynchus Mykiss), and Spring Chinook Salmon (O. Tshawytscha) Interactions in Southeast Washington Streams: 1992 Final Report*. Eastern Washington University, Department of Biology; Washington Department of Wildlife. Prepared for the Bonneville Power

Administration. Project No. 90-053, Contract No. DE-B179-91BP17758. This two-year study to determine if supplementation with hatchery-reared steelhead trout and spring chinook salmon negatively impacted wild bull trout through competition found no impacts at current population levels and habitat quantity and quality. Future research and recommendations include hatchery release modifications, individual impacts, effects of water tempertaure, and an extended study period focusing on microhabitat.

U. S. Army Corps of Engineers (1992). *Walla Walla River Basin Reconnaissance Report, Oregon and Washington*. Walla Walla District. Reviews various water resource needs and opportunities in the Walla Walla River basin and determines their feasibility. It finds that upstream storage, water conservation measures, or water reallocation would provide some relief for irrigation water shortages but are not economically feasible.

U. S. Army Corps of Engineers (1997). *Walla Walla River Watershed Oregon and Washington Reconnaissance Report*. Walla Walla District.
This report evaluates 1) water resource issues associated with flood damage or environmental restoration and 2) potential alternatives for solving problems. It recommends 1) removing levees along WDFW land on the mainstem Walla Walla River, 2) restoration in the Pine Creek basin to increase native fish habitat and re-establish a more natural floodplain, and upland land treatment to reduce erosion, 3) constructing a setback levee in the upper Touchet, 4) reintroduction of salmon to the basin, 5) lining irrigation canals to increase water efficiency, 6) constructing a trap and haul facility at the Walla Walla River mouth, 7) constructing a levee on Coppei Creek and a setback levee along Mill Creek near Five Mile Bridge.

U. S. Bureau of Reclamation (1999). *Watershed Action Plan: Upper Walla Walla River Subbasin Umatilla County, Oregon*. Upper Columbia Area and Pacific Northwest Regional Offices. Prepared for the Walla Walla Basin Watershed Council, Milton-Freewater. Covers goals, public involvement, watershed issues and resource values (including commodity production), and factors affecting resource values

Washington Department of Fish and Wildlife (1993). *1992 Washington State Salmon and Steelhead Stock Inventory*. Olympia. This report documents the results of an initial stock status inventory (SaSI) as a first step in a statewide effort to maintain and restore wild salmon and steelhead stocks and fisheries. The report primarily focuses on current conditions of Washington's naturally reproducing anadromous salmonid populations and not on the adequacy of current resource management objectives.

Washington Department of Fish and Wildlife (1998). *1998 Washington State Salmonid Stock Inventory: Bull Trout/Dolly Varden*. Olympia. Part of the Washington Salmon Stock Inventory (SaSI), a standardized method of identifying wild salmonid stocks, assessing their current status, and describing the factors believed to contribute to their status.

Washington Department of Natural Resources (1998). *South Fork Touchet Watershed Analysis*. Forest Practices Division. This report presents an assessment and prescriptions, along with justification for delineation of sensitive areas.

Limiting Factors

Fish

As discussed in previous sections (Fishery Resources, Habitat Quality) the productivity of the Walla Walla subbasin fishery is currently limited by a number of natural and anthropogenic factors. Key species such as bull trout, steelhead, and chinook have a narrow range of biological requirements and can persist only in areas of suitable habitat. In the Walla Walla, these areas and conditions are sometimes inaccessible to migrating and resident species. When certain species such as bull trout, occupy a particular habitat, they often are unable to remain there throughout all life history stages due to inadequate or degraded environmental conditions. Exclusion from a habitat type may also occur as a result of exotic species competition. Also, out of subbasin pressures such as reduced smolt to adult survival, low adult population sizes, and low stream nutrient input from carcasses have combined to limit production in the subbasin and have reduced native anadromous fish populations within the basin to precipitously low levels (Table 24).

Table 25 identifies known and suspected limiting factors in the Walla Walla subbasin and their general area of occurrence (Figure 23). Although the list is not comprehensive, it identifies the primary factors known to limit key species production throughout various portions of the subbasin.

In order to discuss limiting factors at the subbasin scale, it was necessary to break the drainage up into identifiable polygons. Using the USGS 5th field hydrologic unit code as a reference, the subbasin was divided into eleven units. The units were then divided into stream reaches. The reaches were selected based upon their use in this document (i.e., following the same designation as Appendix D). Table 25 is supplemented by Appendix J, which provides an in-text reference location relative to the limiting factor and specific area of occurrence.

Table 24. General characterization of non-habitat and out-of-subbasin factors limiting salmonid and lamprey production in the Walla Walla subbasin.

Limiting Factor	Description
Out-of-basin mortality (low smolt-to-adult return rates)	Ranks as high limiting factor. Anadromous fish must migrate past four mainstem Columbia River dams twice during their downstream and upstream migration. Columbia River passage, water quality, and estuary conditions are the major concerns.
Current low population size	Ranks as high limiting factor. The current depressed status of the steelhead and bull trout population does not provide much parental base from which to build. Even if population replacement could be maintained, levels would still be far below natural production capabilities and numeric objectives. Spring chinook are currently extirpated and there has been no parental base from which to build.
Low instream nutrient contribution from salmon and lamprey carcasses.	Ranks as a moderate limiting factor. Extirpated spring chinook runs have eliminated a major natural nutrient input source which has reduced productivity in the aquatic ecosystem. Returning natural nutrient input will require successful reintroduction of natural spawning salmon and lamprey populations.
Lack of law enforcement for compliace with environmental protective requirements	Ranked as moderate limiting factor. Environmental protective regulations such as Section 404 Fill and Removal permits, water quality standards, local land use planning requirements and ESA take prohibitions are sometimes not followed and/or enforced resulting in negative impact to fish and wildlife habitat.

Table 25. Key factors limiting salmonid production (Species and Life History) by Geomorphic Management Unit and stream segments in the Walla Walla subbasin (compiled by CTUIR and ODFW; WDFW to provide further review and input).

Location	Key Limiting Factors[1/]	Steelhead Impacts			Sp. Chinook[2/] Impacts			Bull Trout Impacts		
		Migr	Spaw	Rear	Migr	Spaw	Rear	Migr	Spaw	Rear
Upper Walla Walla (UWW)										
S. Fk above Harris Park	None – Key stronghold area	All species and life histories benefited								
S. Fk below Harris Park	CH, IHD, RIP	--	X	X	--	X	X	--	X	X
N. Fk on USFS	None – Key stronghold area	All species and life histories benefited								
N. Fk below USFS	FL, TP, CH, IHD, RIP	--	X	X	--	X	X	X	X	X
Mill Creek (MC)										
Mill Cr. – Source to City Water Intake	None – Key stronghold area	All species and life histories benefited								
Mill Cr. – Water Intake to State Line	FL, PAS, CH, IHD	X	X	X	X	X	X	X	--	X
Mill Cr. – Rooks to Yellowhawk Div.	FL, TP, PAS, CH, IHD, RIP	X	--	X	X	--	--	X	--	--
Mill Cr. – Yellowhawk to Gose St.	FL, TP, WQ, PAS, CH, IHD, SED, RIP	X	--	X	X	--	--	X	--	--
Mill Cr. – Gose to mouth	FL, TP, WQ, PAS, CH, IHD, SED, RIP	X	--	--	X	--	--	X	--	--
Mid Walla Walla (MWW)										
Mainstem WW – Forks to LWW Div.	PAS, CH, IHD, RIP	X	X	X	X	X	X	X	--	X
Mainstem WW – LWW Div to Mill Cr.	FL, TP, PAS, CH, IHD, SED, RIP	X	X	X	X	--	--	X	--	--
Couse Creek	FL, TP, PAS, CH, IHD, RIP	X	X	X	--	--	--	--	--	--
Cottonwood, Russel & Reser Cr.	FL, TP, CH, IHD	X	X	X	--	--	--	--	--	--
Yellowhawk Creek	FL, TP, PAS, CH, IHD, SED, RIP	X	X	X	--	--	--	--	--	--
Garrison Creek	FL, TP, PAS, CH, IDH, SED, RIP	X	X	X	--	--	--	--	--	--
Pine Creek (PC)										
Pine Creek	FL, TP, PAS, CH, IHD, SED, RIP	X	X	X	--	--	--	--	--	--
Walla Walla (WW)										
Mill Cr. to McDonald Road	FL, TP, PAS, CH, IHD, RIP	X	--	--	X	--	--	X	--	--
McDonald Road to Touchet R	FL, TP, PAS, CH, IHD, SED, RIP	X	--	--	X	--	--	X	--	--
Lower Walla Walla (LWW)										
Touchet R. to mouth	FL, TP, PAS, CH, IHD, SED, RIP	X	--	--	X	--	--	X	--	--
Dry Creek (DC)										
Pine & Mud Creeks	FT, TP, SED, RIP	X	X	X	--	--	--	--	--	--
Dry Creek source to Hwy 12	FL, IHD, SED	X	X	X	--	--	--	--	--	--
Dry Hwy 12 to mouth	FL, TP, CH, IHD, SED, RIP	X	X	X	--	--	--	--	--	--
Lower Touchet (LT)										
Touchet R. Hwy 125 to mouth	FL, TP, CH, IHD, SED, RIP	X	--	--	X	--	--	X	--	--
Middle Touchet (MT)										
Touchet R. Dayton to St. Park	TP, PAS, CH, IHD	--	--	X	X	X	X	X	--	--
Touchet R. St. Park to Coppei Cr.	FL, TP, PAS, IHD	--	--	X	--	--	--	X	--	--
Touchet R. Coppei Cr. to Hwy 125	FL, TP, PAS, IHD, SED	X	--	--	X	--	--	X	--	--
Coppei Creek	FL, TP, IHD	X	X	X	--	--	--	--	--	--

Location	Key Limiting Factors[1/]	Steelhead Impacts			Sp. Chinook[2/] Impacts			Bull Trout Impacts		
		Migr	Spaw	Rear	Migr	Spaw	Rear	Migr	Spaw	Rear
Upper Touchet (UT)										
N. Fk source to Wolf Fork	None – Key stronghold area	All species and life histories benefitted								
N. Fk Wolf Fk to mouth	TP, IHD, PAS	--	--	X	--	X	X	X	X	X
Wolf Fork – source to Robinson Fork	None – Key stronghold area	All species and life histories benefitted								
Wolf Fork – Robinson Fork to mouth	TP, IHD, SED, RIP	--	--	X	--	X	X	--	X	X
Robinson Fork	FL, TP, IDH, RIP	--	--	X	--	--	--	--	--	--
S. Fk Touchet: Griffen Fk to mouth	FL, TP, CH, IHD, SED, RIP	--	--	X	X	X	X	X	X	X
S. Fk Touchet: Griffen, Burnt & Green Fks	IHD, RIP	--	--	X	X	X	X	--	X	X

[1]Key Limiting Factors: FL = Flow; TP = Water temperature; WQ = Water quality (chemical); PAS = Passage; CH = Channel conditions; IHD = Instream habitat diversity; SED = Sedimentation; RIP = Riparian; X = Impact to specified life history state (Migr = Migration; Spaw = Spawning; Rear = Rearing)

[2]Spring chinook are in initial stages of reintroduction, therefore impacts are presumptive based on habitat knowledge and anticipated areas of utilization.

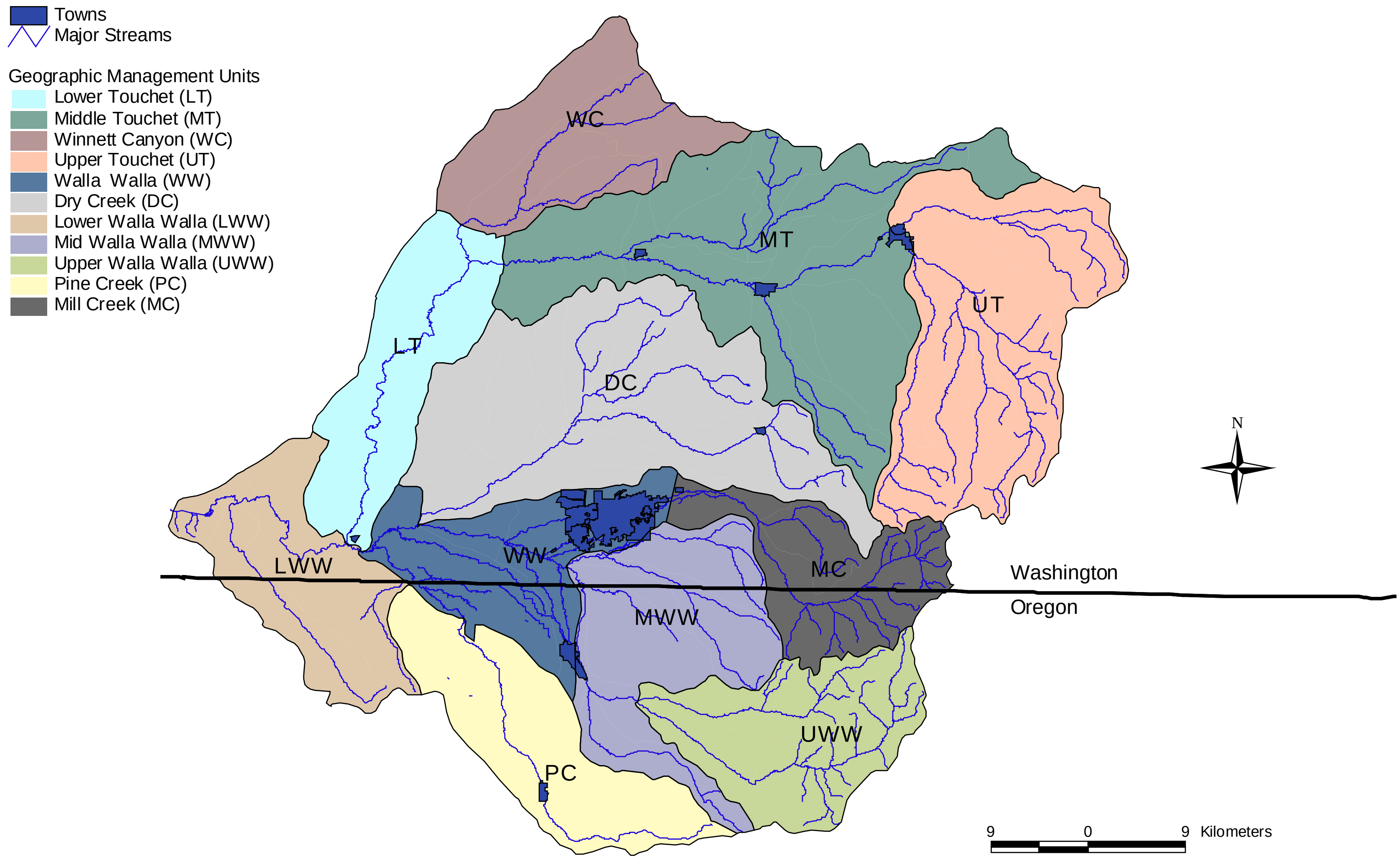


Figure 23. The Walla Walla subbasin stratified by geographic management units (GMUs).

Wildlife

Conversion and Fragmentation of Habitat

Loss of habitat is the primary factor limiting wildlife populations in the subbasin. Late seral ponderosa pine forests in the region have declined between 75-80% (Henjum et al. 1994). Approximately 77% of historic shrubsteppe and grassland vegetation has been converted to agriculture and the remaining shrubsteppe habitats in the subbasin are small isolated patches. This large-scale habitat loss limits the potential for the Walla Walla subbasin to support the wildlife species dependent on these habitats.

Fragmentation of remnant habitats further reduces the suitability of remaining wildlife habitats in the Walla Walla subbasin and increases their susceptibility to noxious weeds and other outside influences. Fragmentation resulting from agricultural development or large fires fueled by cheatgrass negatively affects landbirds due to insufficient patch size for area-dependent species and increases in edge with adjacent hostile landscapes. Fragmentation of shrubsteppe has altered the dynamics of dispersal and immigration necessary for maintenance of some populations at a regional scale (Altman and Holmes 2000a, 2000b). In a recent analysis of neotropical migratory birds within the Interior Columbia basin, most species identified as a high concern to management were dependent on shrubsteppe habitat (Saab and Rich 1997).

Habitat fragmentation and high edge densities are conducive to successful breeding by cowbirds. Cowbirds forage in agricultural areas and near livestock and breed in forest and riparian areas with high passerine densities. The cowbird is a brood parasite, laying its eggs in the nests of other species and negatively impacting the survival of the host species young. Nest parasitism by cowbirds has been documented for over 220 bird species, and at least 144 species have successfully fledged cowbird young. Source habitats for brown-headed cowbirds have increased dramatically over historic conditions in the Walla Walla subbasin (Wisdom et al. 2000).

Table 26 and Table 27 illustrate some key habitat components for riparian and shrubsteppe dependent focal species and their respective limiting factors in the Walla Walla subbasin. The loss of healthy riparian corridors is particularly problematic to the wildlife species of the subbasin as it limits their ability to disperse when habitat conditions change.

Table 26. Habitat relationships of focal species in riparian habitats of the Columbia plateau Landbird Conservation Planning Region (Altman and Holmes 2000a, 2000b).

Conservation Focus	Focal Species	Key Habitat Relationships			
		Vegetative Composition [a]	Vegetation Structure [b]	Landscape/ Patch Size	Special Considerations
large snags	Lewis' woodpecker	cottonwood	>2 snags/ha >16 in dbh; >2 trees/ha >21 dbh; canopy cover 10-40%; shrub cover 30-80%		dependent on insect food supply; competition from starlings detrimental
large canopy trees	Bullock's oriole	cottonwood	canopy tree height >35 ft; canopy closure 30-60%; recruitment trees >10% cover		not area-sensitive; not landscape-sensitive; positive response to edge
Subcanopy foliage	yellow warbler	willow, cottonwood,	>70% cover in shrub and subcanopy with subcanopy >40% of that; >70% cover native species		highly vulnerable to cowbird parasitism; grazing reduces understory structure
dense shrub layer	yellow-breasted chat	willow, snowberry, wild rose	shrub layer 1-4 m tall; 30-80% shrub cover; scattered herbaceous openings; tree cover <20%		vulnerable to cowbird parasitism; grazing reduces understory structure
large, structurally diverse patches	yellow-billed cuckoo	cottonwood, willow	3 or more layers with >20% cover in each layer; canopy closure >50%; patches wider than 100 m and >40 ha	>40 ha	close to extirpated; area-sensitive; susceptible to human disturbance
shrub density	willow flycatcher	willow	shrub patches >10 m sq; shrub cover 40-80%; shrub height >1 m; tree cover <30%	>8 ha	highly vulnerable to cowbird parasitism; grazing reduces understory structure
shrub-herbaceous interspersion	lazuli bunting	willow, snowberry, red-osier dogwood	interspersion shrub and herbaceous where neither >70%		highly vulnerable to cowbird parasitism

[a]Preferred species
[b]Vegetative structure is a condensed version of the habitat objectives for each species. Refer to the text for more detailed description of habitat objectives.

Table 27. Habitat relationships of focal species in shrubsteppe habitats of the Columbia plateau Landbird Conservation Planning Region (from Altman and Holmes 2000a, 2000b).

Conservation Focus	Focal Species	Key Habitat Relationships			
		Vegetative Composition [a]	Vegetation Structure [b]	Landscape Patch Size	Special Considerations
native bunchgrass cover	grasshopper sparrow	native bunchgrasses	bunchgrass cover >15% and >60% total grass cover; bunchgrass >25 cm tall; shrub cover <10%;	>40 ha (100 ac)	larger tracts better; exotic grass detrimental; vulnerable in agricultural habitats from mowing, spraying, etc.
interspersion tall shrubs and openings	loggerhead shrike	sagebrush, bitterbrush	patches shrubs >1 m tall; <15% tall shrub cover; shrub height >1 m; herb cover <20%; open ground >30%		prey base may be affected by pesticides; need low ground cover; invasion of exotic grasses detrimental
Burrows	burrowing owl		open ground cover >40%; native grass cover <40% and <40 cm tall		dependent upon burrow providers (e.g., ground squirrels, badgers); sensitive to nest disturbances; 200 m buffer zone around nest burrow
deciduous trees and shrubs	sharp-tailed grouse		canopy cover 15-35% >15 cm above ground; forb cover >10%; non-native herbaceous cover <5%		
large areas; diverse herbaceous understory	sage grouse	big sagebrush	sagebrush cover 10-30%; forb cover >10%; bunchgrass cover >10%; open ground cover >10%; non-native herb cover <10%		area-sensitive
large, contiguous patches sagebrush	sage sparrow	big sagebrush	sagebrush cover 10-25%; sagebrush height >50 cm; herb cover >10%; open ground >10%	>1,000 ha (2,500 ac)	area-sensitive, needs large blocks; patchy sage preferred over contiguous dense sage; vulnerable to cowbirds
sagebrush cover	Brewer's sparrow	big sagebrush	sagebrush cover 10-30%; sagebrush height >60cm; herb cover >10%; open ground >20%; non-native herb cover <10%		not area-sensitive, but sensitive to sage cover; vulnerable to cowbirds
sagebrush height	sage thrasher	big sagebrush	sagebrush cover 5-20%; sagebrush height >80 cm; herb cover 5-20%; other shrub cover <10%; non-native herb cover <10%	>16 ha (40 ac)	not area-sensitive ; not impacted by cowbirds; high moisture sites with tall shrubs
ecotonal edges herbaceous, shrub,	lark	bitterbrush,	edge habitat with mosaic of growth		dry upland sites with minimal exotic weed cover; vulnerable to

Conservation Focus	Focal Species	Key Habitat Relationships			
		Vegetative Composition [a]	Vegetation Structure [b]	Landscape Patch Size	Special Considerations
tree habitats	sparrow	sagebrush	forms where none exceeds 50% cover; open ground cover >20%		cowbird parasitism
sparsely vegetated desert scrub	black-throated sparrow	shadscale, spiny hopsage, budsage	shrub cover <20%; herbaceous cover <25%; open ground >40%; non-native herb cover <15%		dry upland sites with minimal exotic weed cover
scattered, mature juniper trees	ferruginous hawk	juniper	isolated, mature juniper trees >1/1.6 km; herbaceous-low shrub cover 15-60 cm tall		dependent upon prey (e.g., ground squirrels, jackrabbits); sensitive to human disturbance; 1 km buffer zone around nests

[a] Preferred species.
[b] Vegetative structure is a condensed version of the habitat objectives for each species. Refer to the text for more detailed description of habitat objectives.

Loss of Habitat Diversity

Changes in forest habitat components have reduced habitat availability, quality, and utilization for wildlife species dependent on timbered upland habitats. In natural landscapes stochastic events produce landscapes that are far more complex than those found in managed forests. Variations in susceptibility to disturbance, weather patterns, and soil moisture result in forest patches of a variety of shapes, sizes, and a full spectrum of stand age classes. This variation results in a tremendous variety of juxtapositions between habitat types (Mckelvey et al. 2000). The heterogeneity of forest species and stand age classes in the subbasin has been reduced through timber harvest and fire suppression. Timber harvest has reduced the prevalence of old growth forest types in the basin, particularly among economically important species like ponderosa pine. Fire suppression has severely altered the fire regime of the subbasin (Figure 24). Fire occurs less frequently; this has allowed shade tolerant species such as Douglas fir and grand fir to increase in prominence. Reductions in fire frequency have resulted in increased fuel loads in the subbasin, so that when fires do occur they tend to be more severe stand replacing fires (Quigley and Arbelbide 1997a).

Snags and Down Wood

One particularly important element of forest diversity that has been reduced in the subbasin is the prominence of snags and downed wood. In the Blue Mountains of Oregon and Washington, nearly 100 different wildlife species of birds and mammals utilize dead and down tree habitats for nesting, feeding, and perching. Nearly 60 species depend on suitable wildlife trees and associated cavities for their survival. Primary excavators such as the pileated woodpecker create holes in dead and dying trees that may be used later by secondary cavity users such as owls, bluebirds, wrens, and flying squirrels (U. S. Forest Service 1990). Washington State has identified snag and down wood habitats as priority habitats.

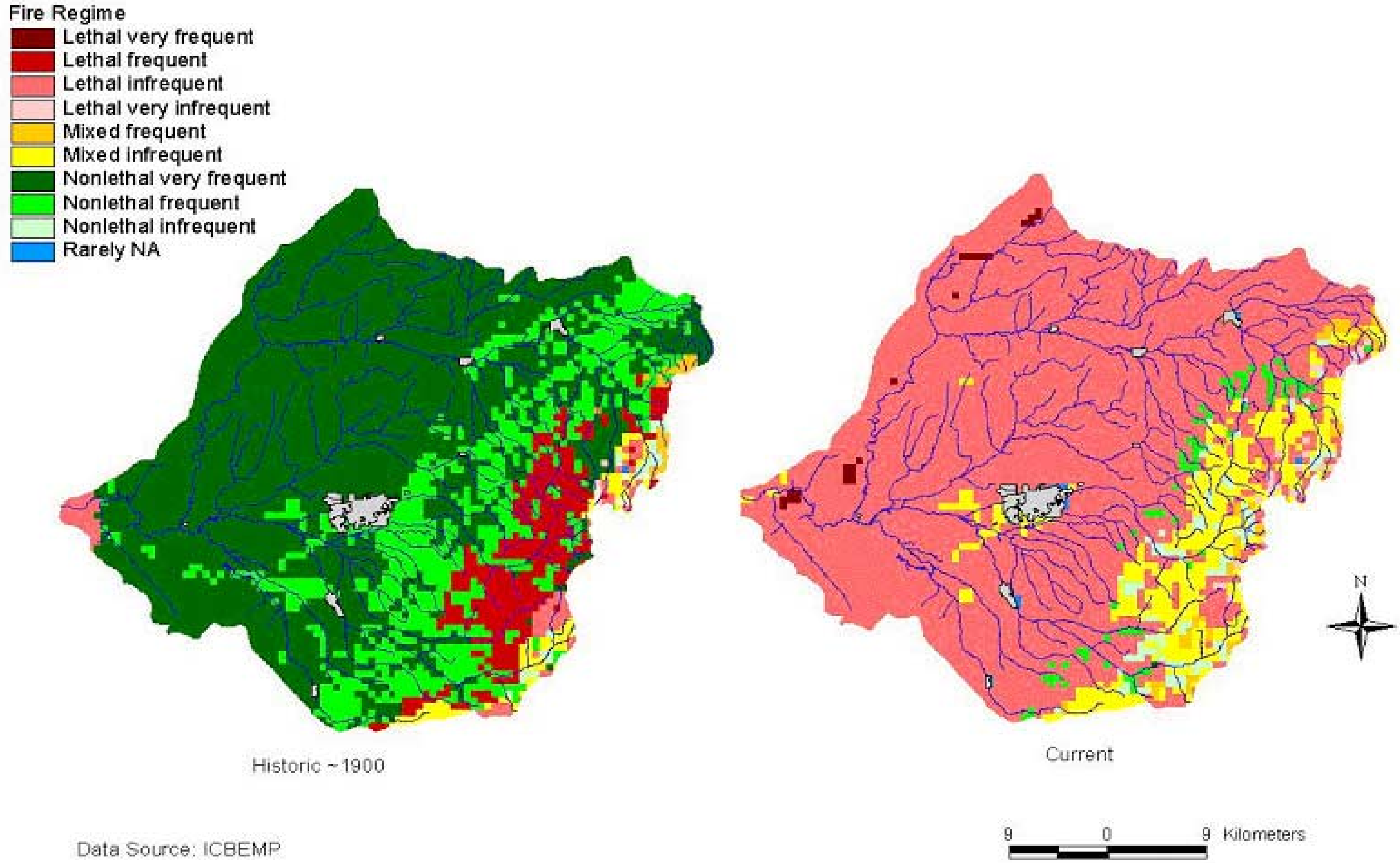


Figure 24. Changes in fire frequency and severity in the Walla Walla subbasin.

Dead and down wood is typically more abundant in true fir and mixed conifer stands across the subbasin, but less abundant in fire-regulated pine communities. Large-diameter trees will remain longer on the landscape than small-diameter trees. Dead wood densities will fluctuate across the landscape as a result of natural mortality. Snag and down wood abundance is subject to the frequency and intensity of large and small-scale disturbances such as fires, insects, disease, ice storms, and drought that have historically occurred throughout the area (Quigley and Arbelbide 1997a).

The prominence of snags and downed wood is a particularly important element of forest diversity that has been reduced in the subbasin. In the Blue Mountains of Oregon and Washington, nearly 100 different wildlife species of birds and mammals use dead and down tree habitats for nesting, feeding, and perching. Nearly 60 species depend on suitable wildlife trees and associated cavities for their survival. Primary excavators such as the pileated woodpecker create holes in dead and dying trees that may be used later by secondary cavity users such as owls, bluebirds, wrens, and flying squirrels (U. S. Forest Service 1990).

Snags and woody debris are most common in old and mature forests that have declined in the region (Quigley and Arbelbide 1997a; U. S. Forest Service 1990). A comparison of the coarse scale historic and current structural stage GIS layers developed by ICBEMP indicates a decline in old growth forests and woodlands in the Walla Walla subbasin of almost 90%. Dead and down wood is more abundant in true fir and mixed conifer stands across the subbasin, but less abundant in fire-regulated pine communities. Large-diameter trees will remain longer on the landscape than small-diameter trees. Dead wood densities will fluctuate across the landscape as a result of natural mortality. Snag and down wood abundance is subject to the frequency and intensity of large and small-scale disturbances such as fires, insects, disease, ice storms, and drought that historically occurred throughout the area (Quigley and Arbelbide 1997a).

Nutrient Flow Reduction

Spawning salmon populations form an important link between the aquatic, riparian, and terrestrial communities. Anadromous salmon help to maintain ecosystem productivity and may be regarded as a keystone species. Salmon runs input organic matter and nutrients to the trophic system through multiple levels and pathways including direct consumption, excretion, decomposition, and primary production. Direct consumption occurs in the form of predation, parasitism, or scavenging of the live spawner, carcass, egg, or fry life stages. Carcass decomposition and the particulate and dissolved organic matter released by spawning fish deliver nutrients to primary producers (Cederholm et al. 2000). Cederholm identified nine wildlife species that have (or historically had) a strong consistent relation ship with salmon; of these the common merganser, harlequin duck, osprey, bald eagle, Caspian tern, black bear, and northern river otter occur in the Walla Walla subbasin. Eighty-three other wildlife species were identified as having a recurrent or indirect relation ship with salmon, and many of these also occur in the Walla Walla subbasin (Cederholm et al. 2000). The golden eagle, bald eagle, peregrine falcon, and bank swallow are among those that are state or federally listed/candidate species.

Exotic Species

Cheatgrass and Noxious Weeds

Disturbance of the grass and shrubland ecosystems by livestock has contributed to the spread of introduced grasses and weeds including cheatgrass (*Bromus tectorum*) and yellow starthistle (*Centauria solstitialis*). These invader species are native to the Mediterranean but have thrived in the subbasin due to similarities in climate between the two locations (Quigley and Arbelbide 1997a). All 55 transects sampled by the WDFW on shrubsteppe ecosystems in the Columbia basin contained exotic annual grasses and exotic forb species (Dobler et al. 1996). Introduced vegetation species in the subbasin often out compete native vegetation species reducing the suitability of habitat available to the wildlife species adapted to it (Quigley and Arbelbide 1997a).

Recent surveys conducted by the Columbia County Weed Board (2000) in the Touchet watershed found that 85% of upland range habitat was infested with yellow starthistle. Yellow starthistle displaces native plant communities and reduces plant diversity. It can accelerate soil erosion and surface runoff. Yellow starthistle forms solid stands that drastically reduce forage production for wildlife.

Spotted knapweed (*Centaurea maculosa*) is another noxious weed increasing in prominence within the subbasin. This noxious weed also reduces wildlife forage. Spotted knapweed infestations have been found to decrease bluebunch wheatgrass by 88%. Elk use was reduced by 98% on range dominated with spotted knapweed compared to bluebunch dominated sites (Columbia County Weed Board 2000). Other problem exotic plant species in the subbasin includes rush skeletonweed (*Condrilla juncae*), spikeweed (*Hemizonia* pungens), and perennial pepperweed (*Lepidium latifolium*).

Control of exotic plant species is critical to the maintenance of native shrubsteppe and grassland habitats and productive livestock rangelands, and the preservation of native wildlife species. The diversity of terrestrial birds was positively correlated with plant diversity. Surveys of shrubsteppe ecosystems conducted by the WDFW showed that sage thrasher, sage sparrow, and white crowned sparrow occurrence was negatively correlated with percent cover of annual grass. None of the 15 bird and small mammal species in the study showed a positive correlation with percent annual grass cover (Dobler et al. 1996). Columbian sharp-tailed grouse prefer eating native vegetation rather than introduced species, although cultivated grains supplement their diet (Hays et al. 1998).

Bullfrogs

The American bullfrog, native to eastern North America from Canada to the Gulf of Mexico, has been introduced to all areas west of the Rocky Mountains. Numerous studies have shown that the bullfrog out-competes native amphibians due to its aggressive behavior and rapid growth rate (Corkran and Thomas 1996; Charlotte Corkran, personal communication, February 2, 2001; Marc Hayes, WDW, personal communication, February 5, 2001). The bullfrog's preferred habitat is similar to that of many other amphibians native to the Walla Walla subbasin, especially that of the Oregon spotted frog (Charlotte Corkran, personal communication, February 2, 2001; Mark Hayes, WDW, personal communication, February 5, 2001. Bullfrog predation is considered a major factor in the decline of many of these species (Csuti et al. 1997).

Virginia Opossum

The opossum is native to the eastern United States; they were introduced to Oregon between 1910 and 1920. They now occur within the Walla Walla subbasin. Opossum are opportunistic feeders and consume a variety of small birds, mammals, and reptiles (Csuti et al. 1997). Opossum predation on bird eggs may be limiting native bird population and is a concern for wildlife managers in the subbasin.

Hydropower System Development and Operations

The development and operation of dams for hydropower, navigation, flood control, and irrigation in the Columbia River basin resulted in widespread changes in riparian riverine and upland habitats. Documented losses from studies conducted in the late 1980s associated with each hydropower facility are provided in Table 28 (Susan Barnes, ODFW, personal communication, February 2001).

Table 28. Habitat losses associated with hydropower development

Hydropower Facility	Habitat Acres Inundated	Habitat Units Lost
Bonneville	20,749	12,317
The Dalles	1,923	2,230
John Day	27,455	14,398
McNary	15,502	19,397

Hydropower development has resulted in urban expansion, numerous roads and railways, and other structures. The creation of reservoirs has permitted the expansion of irrigation, thus resulting in extensive habitat conversion. The frequency and duration of water level changes has influenced vegetation succession on islands and along shorelines. In some cases these fluctuating water levels have created barren vegetation zones and exposed wildlife to increased predation. Low water levels create land bridges that provide predators access to nesting islands. For example, inundation of gravel bars and sandy islands reduced the available area for nesting and resting waterfowl. Other results of hydropower development and operation often include the draining and filling of wetlands, stream channelization, shoreline rip rapping, construction and maintenance of transmission power corridors, increased access to and harassment of wildlife, and increased erosion and sedimentation in the Columbia River and its tributaries.

The construction of McNary Dam made possible the irrigation of about 244,000 acres of land in Oregon and Washington, a portion of which falls within the Walla Walla subbasin (Susan Barnes, ODFW, February 2001).

Land Protection Status

Eighty-nine percent of the subbasin is privately owned. This makes providing long-term stable wildlife habitat challenging and increases interactions between wildlife and the public. For example, 83% of the winter elk range in the subbasin is privately owned, most of which is grazed or farmed. Elk at management objective levels use the privately owned winter range at fairly high densities (Table 29). Winter elk use of grazing land or agricultural land often creates elk damage (Oregon Department of Fish and Wildlife

1992c). The level of elk damage contributes to lowering target population numbers (Management Objective) agreed to by the state of Oregon (Oregon Department of Fish and Wildlife 1986). Since almost all of the winter range is privately owned and operated for natural resource extraction (grazing, dryland farming), elk are using resources during the winter that the landowners intend to use for other purposes. This creates damage and forces the state to reduce herd levels.

Table 29. Elk densities at management objective level in the Oregon portion of the Walla Walla subbasin.

Average Elk Density at Management Objective Level					
Winter Range			Summer Range		
Total	Public	Private	Total	Public	Private
18.9	22.9	16.7	11.1	11.5	10.0

Acquiring and protecting important wildlife habitat areas in the subbasin is a management priority. Maintaining and increasing the lands registered under the CRP program is crucial to this effort, particularly if sharp-tailed grouse are to be reintroduced to the subbasin since most of their potentially habitat is on privately owned lands (Kagan et al. 2000). Many of the CRP lands in the subbasin are scheduled to be removed from the program in 2001; if this occurs most of this habitat would be lost as farmers moved to make money on these lands by plowing or grazing them. Land acquisition efforts are hindered by the steadily rising cost of land in the subbasin. Opportunities to restore wildlife populations and improve habitat diminish over time as habitat loss and degradation continues (Susan Barnes, ODFW, personal communication, February 2001).

Species-Specific Limiting Factors

Forest Dependent Species

MacGillivray's Warbler (Altman and Holme 2000a, 2000b)

- Loss of brushy habitat in the understory of mixed conifer stands
- Reduced shrub cover due to grazing intensity, wildfires, and herbicide use

Flammulated Owl (Altman and Holmes2000a, 2000b)

- Loss of mature and old growth trees and snags for nesting and roosting; flammulated owls are among the last of the cavity-nesting migrants to return to the area. This reduces their nesting opportunities as many suitable sites are already occupied by other species.
- Loss of open understory because of invasion of exotics and fire intolerant species Reduction in the availability of small dense thickets for roosting

Canada Lynx (Ruggiero et al. 1999)

- Lack of suitable foraging, denning, or travel habitat
- Inadequate juxtaposition of forage, denning or travel habitat

- Inadequate prey species availability
- Human interaction (trapping, highways, urbanization, etc.)

Wolverine (Witmer et al. 1998)

- Insufficient amounts of remote forest habitats.
- Insufficient rock and talus areas for natal dens
- Human interaction (trapping, highways, urbanization, etc.)

Wetland and Riparian-Dependent Species

Columbian Spotted Frog (Marcot et al. 1997, McAllister and Leonard 1997)

- Loss of wetlands and changes in plant community structure
- Insufficient aquatic vegetation for cover and foraging
- Limited amounts of down wood and woody debris in wetland habitats
- The spread of exotic aquatic predators like bullfrogs and warm water fishes

Northern Leopard Frog

- Limited amounts of down wood and woody debris in wetland habitats
- Loss of wetlands and changes in plant community structure
- The spread of exotic aquatic predators like bullfrogs and warm water fishes

Red-eyed Vireo (Altman and Holmes2000a, 2000b)

- Reduced shrub understory
- Livestock grazing in riparian habitat due to reductions in insect productivity and recruitment of young cottonwoods

Bald Eagle (Bureau of Land Management and U. S. Fish and Wildlife Service 1986)

- Reduced late and old structure along major tributaries.
- Disturbance around potential nesting and roosting habitat (riparian corridors)

Managed Species

Elk

- Winter range, particularly on publicly owned protected areas
- Noxious weeds

Blue Grouse (Larsen and Nordstrom 1999)

- Reforestation practices that include high density replanting, herbicide application, result in dense canopy closure which reduces blue grouse use
- In drier areas, intense grazing of open lowland forests reduces the quality and availability of breeding habitat

Mountain Quail (Larsen and Nordstrom 1999)

- Inadequate food supply caused by habitat loss
- The loss of winter habitat from dams and water impoundments.

- Loss of riparian connectivity reduces dispersal between populations and ability to relocate after disturbance

Extirpated Species

Sharp-Tailed Grouse

- Availability of stable protected shrubsteppe habitat (Crawford and Coggins 2000)
- Availability of shrub species including service berry (*Amelanchier alnifolia*), chokecherry (*Prunus virginiana*), and hawthorn (*Crategus douglassi*) as food and cover

Bighorn Sheep

- Domestic sheep use
- Loss of rocky outcroppings

Artificial Fish Production

Currently, artificial production within the subbasin is limited to summer steelhead and resident trout programs in the Washington portion of the subbasin and a spring chinook adult outplanting program in Mill Creek and the South Fork Walla Walla River. The steelhead and resident trout programs are conducted as part of the Lower Snake River Compensation Program (LSRCP), a congressionally mandated mitigation program for fish and fishery losses on the Snake River. The LSRCP program was extended to the Walla Walla subbasin due to insufficient mitigation opportunities in the Washington portion of the Snake River. Steelhead mitigation goals for the subbasin are to return 900 adults to the mainstem Walla Walla River and 700 to the Touchet River. In addition, an endemic steelhead program was initiated under the LSRCP in 2000 with the collection of broodstock from the Touchet River.

Lyons Ferry hatchery stock steelhead (a non-endemic stock comprised of Wells Hatchery and Snake River parentage) are released into the Touchet River and mid mainstem Walla Walla River in Washington. In the past, steelhead were also released into lower Mill Creek but these releases were discontinued in 1998. As the endemic broodstock program is developed, the intent is to convert the Lyons Ferry hatchery stock program over to the endemic stock in the basin. This change to a local stock may be problematic for the Walla Walla River releases, and is still under discussion. A draft hatchery and genetic management plan was recently developed for the Touchet River to address these and other concerns (Appendix L). Resident rainbow and brown trout have also been released in the Washington portion of the subbasin. Stocking of brown trout was terminated in 1998 and stream stocking of rainbow trout will be discontinued in 2001. Starting in 2001, rainbow trout will only be stocked in lakes and impoundments. Table 30 presents a summary of LSRCP steelhead and trout releases for the past few years.

Although no hatchery summer steelhead releases have occurred in the Oregon portion of the basin, a streamside incubation program did occur for a few years in the 1980s. Local sportsmen, in conjunction with ODFW, spawned wild steelhead from Couse Creek and Yellowhawk Creek. Eggs were incubated streamside and fry volitionally released back into Couse Creek.

In the past, legal-sized rainbow trout were also stocked into the Oregon portion of the subbasin. While stocking had also occurred in the mainstem and North Fork Walla Walla River, only the South Fork Walla Walla River received fish over the last decade of releases. All stocking of rainbow trout in the Oregon portion of the basin was discontinued in 1994 to protect wild stocks of *O. mykiss*. Numbers of trout stocked in the South Fork Walla Walla River are summarized in Table 31.

Table 30. Steelhead and resident trout releases in the Washington portion of the Walla Walla subbasin (Washington Department of Fish and Wildlife 2000d).

Year	Species	Location	Number of Fish	Pounds of Fish
Anadromous Fish				
2000	Steelhead	Walla Walla River	165,500	40,000
		Touchet River	124,654	34,820
1999	Steelhead	Walla Walla River	176,000	37,500
		Touchet River	124,651	25,439
1998	Steelhead	Walla Walla River	165,855	35,150
		Touchet River	125,127	22,732
		Lower Mill Creek	9,165	1,950
1997	Steelhead	Walla Walla River	170,980	30,650
		Touchet River	142,824	21,444
		Lower Mill Creek	21,900	3,000
1996	Steelhead	Walla Walla River	170,000	38,154
		Touchet River	134,000	30,593
		Mill Creek	19,998	4,380
1995	Steelhead	Walla Walla River	158,875	29,375
		Touchet River	120,710	32,189
		Lower Mill Creek	15,200	4,000
Resident Fish				
2000	RB	Touchet River	2,000	833
1999	RB	Mill Creek	2,015	650
	RB	Touchet River	2,014	629
1998	RB	Mill Creek	5,000	1,852
	RB	Touchet River	2,074	715
	BrT	Touchet River	9,205	2,830
1997	RB	Mill Creek	7,000	1,836
	BrT	Touchet River	10,188	2,830
	RB	Coppei Creek	972	216
	RB	Dry Creek	972	216
1996	RB	Mill Creek	6,630	2,117
	BrT	Touchet River	10,505	3,689
	RB	Coppei Creek	1,007	265
	RB	Dry Creek	1,007	265
1995	RB	Mill Creek	7,036	1,837
	BrT	Touchet River	10,752	3,235
	RB	Coppei Creek	1,521	390
	RB	Dry Creek	1,521	390

BrT= brown trout, RB= rainbow trout

Table 31. Rainbow trout stocked in the South Fork Walla Walla River from 1991–2000 (Oregon Department of Fish and Wildlife data).

Year	Location	Number
1991	Harris Park Area	6,004
1992	Harris Park Area	9,003
1993	Harris Park Area	9,005

An adult spring chinook outplanting program was initiated in 2000 by CTUIR. Surplus Carson stock spring chinook from Ringold Springs Hatchery were transferred to the adult holding and spawning facility on the South Fork Walla Walla River. Adults were held until just prior to spawning and were released into natural production areas in Mill Creek and South Fork Walla Walla River. A total of 364 adults were outplanted in 2000 but the original proposal calls for up to 1,500 adults to be outplanted if available. Outplanting will continue pending availability of adults.

The only existing artificial propagation facilities in the subbasin are a spring chinook adult facility on the South Fork Walla Walla River and a steelhead acclimation facility on the Touchet River in Dayton. The spring chinook adult facility is used for holding and spawning of broodstock from the Umatilla River and holding adults for the Walla Walla outplanting program. The Dayton Conditioning Pond is a LSRCP facility used for acclimating steelhead prior to release in the Touchet River.

Although no incubation and rearing facilities currently exist in the subbasin, a spring chinook hatchery is being proposed by the CTUIR as part of both the Umatilla River Supplemental Master Plan and Walla Walla master planning efforts. The master plans are scheduled to go through the NPPC review process later in 2001. The facility would be located at the same site as the existing South Fork Walla Walla adult holding facility. This site was chosen due to the high water quality and suitable temperature profile for all spring chinook life history stages. The hatchery would produce spring chinook yearling smolts for both the Umatilla and Walla Walla Rivers. The Walla Walla Master Plan being drafted by CTUIR also proposes to initiate an endemic stock summer steelhead program for the Oregon portion of the basin. It is anticipated that these fish would be reared at the Umatilla Hatchery, which has a more suitable temperature profile for rearing summer steelhead. They would then be transferred to the South Fork Hatchery as smolts for final rearing and release. There currently is no consensus regarding steelhead supplementation in the Oregon portion of the subbasin.

Existing and Past Efforts

Summary of Past Efforts

Efforts to address fish and wildlife concerns in the subbasin have included management coordination, watershed assessment and planning, and habitat enhancement. These efforts have been funded by several agencies, including BPA, LSRCP, USDA, USFS, USFWS, NRCS, WDFW, ODFW, and CTUIR.

The Columbia Basin Fish and Wildlife Authority (1999) has documented BPA funded watershed enhancement projects for the subbasin since 1986. Such projects have included planning activities, hatchery construction, outplanting, law enforcement, and fish habitat improvements. Although funded by BPA, these projects have been implemented by other entities (Table 32). Other projects in the subbasin have been funded and implemented independently or cooperatively by several national, regional, or local agencies (Table 33).

Table 32. BPA-funded Columbia River Basin Fish and Wildlife Program activities within the Walla Walla River subbasin. (Columbia Basin Fish and Wildlife Authority 1999; Pacific States Marine Fisheries Commission 2001; Bonneville Power Administration and Northwest Power Planning Council 1999; Glen Mendel, WDFW, personal communication, January 2001; Allen Childs, CTUIR, personal communication, February 2, 2001).

Project	BPA #	Sponsor	Duration
Passage Improvement			
Walla Walla River fish passage	20139	CTUIR	2000-2004
Walla Walla River juvenile passage	9601100	CTUIR	1997-2004
Adult fish passage in the subbasin	9601200	CTUIR	1996-1999
Habitat Enhancement			
Rainwater Wildlife Area wildlife mitigation (8,678 Acres)	20082	CTUIR	2000-2005
Walla Walla, Touchet, and Mill Creek riparian habitat enhancement	9606400	WWCCD	1996-1998
Couse Creek riparian enhancement.	9604600	CTUIR	1996-1998
Walla Walla River subbasin watershed improvement project	9606450	CTUIR	
Artificial Propagation			
NEOH Hatchery development	20138	CTUIR	2000
Steelhead enhancement and spring chinook reintroduction	9604600	CTUIR	1996-1998
Spring Chinook and steelhead supplementation	8805302	CTUIR	1989-1999
South Fork Walla Walla aquaculture facilities: site feasibility and conceptual design	8805300	Montgomery Watson	1991-1993, 1995-1997, 2000-2004

Table 33. Non BPA-funded fish and wildlife activities within the Walla Walla River subbasin. (Robert Gordon, Walla Walla City Water Division Manager, December 7, 2000; Tim Bailey, ODFW, personal communication, December 29, 2000; Glen Mendel, WDFW, personal communication, January 3, 2001; Northrop 1998b; Paul Ashley, WDFW, personal communication, February 2, 2001; Allen Childs, CTUIR, personal communication, February 2, 2001)

Project	Funding/Lead Agency	
Passage Improvement		
Juvenile fish screens in the Oregon portion of the Walla Walla River	ODFW	2001
Fish passage and screening at the Walla Walla water intake on Mill Creek	OWEB, NMFS/ Walla Walla	2001
South Fork Walla Walla adult passage	OWEB, WWBWC, private	ongoing
North Fork Walla Walla adult passage	OWEB, WWBWC, private	ongoing
Adult passage on Stone Creek	WDFW, WWCD	complete
Adult passage on Mill Creek	WDOT/WWCD	complete
Fish passage and screening on Mill Creek	SRFB/WWCD	complete
Adult passage at the Touchet River pushup diversions	IAC/CCD	planning
Fish passage and screening at the Bennington Lake Intake on Mill Creek	SRFB, USACE/ WDFW, USACE	ongoing
Screen retrofitting throughout the Oregon portion of subbasin	Mitchell Act/ODFW	ongoing
Diversion inventory and screening in WA	SRFB/WDFW	ongoing
Adult passage on the South Fork Kibbler Creek	OWEB, CTUIR/WWBWC	planning
Adult passage on the South Fork Hopper Creek	OWEB, CTUIR/WWBWC	planning
Adult passage on the North Fork Sams Creek	OWEB, CTUIR/WWBWC	planning
Adult passage on the North Fork Walla Walla River	OWEB, CTUIR/WWBWC	planning
Adult passage on Bullock Creek	OWEB, CTUIR/WWBWC	planning
Adult passage at the Lewis Creek barrier	SRFB/CCD & WDFW	planning
Adult passage on the South Fork Robertson Creek	OWEB, CTUIR/WWBWC	planning
Adult passage at Garrison Creek	College Place, USACE	planning
Adult passage at the Gose Street Bridge on Mill Creek	USACE	planning
Adult passage at Carlson Creek	NRCS	planning
Adult passage at Whitman Mission on Doan Creek	NPS	planning
Fish passage and screening at the eastside Nursery Pump on the Walla Walla River	ODFW	planning
Adult passage at Fern and 9th Streets on Yellowhawk Creek	SRFB/WWCD	planning
Adult passage at Whiskey Creek Dam	SRFB/WDFW	ongoing
Adult passage at the small dams on Yellowhawk Creek	SRFB/WWCD	ongoing

Project	Funding/Lead Agency	
Adult passage and riparian enhancement at Patit Creek	CCD/WDFW & private	ongoing
Headgate installation	OWRD, UC, NRCS, OWEB, WWBC	
Little Walla Walla diversion consolidation and conservation	USBR, WWID, HBIC, OWRD	
Screening on the lower Walla Walla River, Garrison Creek, and Mill Creek	USACE/Walla Walla County	
Adult passage at Dry Creek, OR at the Buroker Dam		
Adult passage at Pine Creek, OR at the Hudson Bay Canal Road		
Adult passage at Dry Creek, WA		
Adult passage at Reeser Creek Dam		
Adult passage at the Mud Creek culvert		
Adult passage at Pine Creek, WA		
Adult passage on Mill Creek		
Adult passage at the Yost Ditch on the Touchet River		
Adult passage at the Hern Ditch on the Touchet River		
Adult passage at Couse Creek		
Adult passage at Dry Creek, WA dams on Sapolil Road		
Fish passage and screening throughout the subbasin	WDFW	
Flow Enhancement		
Irrigation conservation to enhance stream flow	OWEB/WWBWC	
Water allocation	WDE, OWRD	
Stream flow enhancement throughout the subbasin	WDE, OR Water Trust, OWRD	
Filing for instream water rights for stream flow enhancement throughout the subbasin	ODFW	
Acquire water to address stream flow enhancement throughout the subbasin	OWRD	
Stream flow enhancement throughout the subbasin	WA Water Trust	
Water developments on Page Ridge, Maloney Mountain, and Eckler Mountain	USFS, WDFW, RMEF	
Habitat Enhancement		
Rainwater Wildlife Area watershed restoration	Washington State/CTUIR	1999-2000
Tussock moth mitigation	UNF, Walla Walla city	2000
Habitat enhancement	CCD, WWCCD	1997-ongoing
Couse Creek/Shumway riparian and instream restoration	ODFW, NRCS, Walla Walla Watershed Council, CTUIR	1996-2001
Wildlife enhancement for Mill Creek Reservoir area	USACE, WDG	1980
LSRCP mitigation	USACE, WDG	1979-1984
LSRCP wildlife mitigation	USACE, WDG	1977-ongoing

Project	Funding/Lead Agency	
South Fork Walla Walla trail reconstruction	USFS	ongoing
Road maintenance	USFS	ongoing
Stream habitat enhancement throughout Columbia County	SRFB, various/CCD	ongoing
Upland enhancement via direct seeding	SRFB/CCD	ongoing
Stream enhancements across the subbasin	Milton-Freewater Water Control District/USACE	ongoing
Habitat enhancement on Patit Creek	SRFB/CTUIR	ongoing
Habitat enhancement on the South Fork Touchet	SRFB/CTUIR	ongoing
Habitat protection throughout the Walla Walla subbasin	CTUIR	ongoing
Stream habitat enhancement throughout the subbasin	Col. CD, WWCD/ODFW	ongoing
Fish and habitat management planning for Habitat Conservation Plan	Irrigation Districts	ongoing
Flood Control District planning for buffers	Prescott	ongoing
Habitat enhancement throughout subbasin	private	ongoing
Wallula Wetlands enhancement	USFWS	ongoing
Habitat enhancement on Stone Creek	Wal-Mart	ongoing
Upland Restoration Plantings	WDFW	ongoing
Habitat enhancement throughout the subbasin	WDE	ongoing
Stream habitat enhancement throughout the subbasin	WWCD	ongoing
Direct seeding	SRFB/WWCD	ongoing
Stream enhancements throughout the subbasin	Various/WWBWC	ongoing
Weed control projects	USFS, County Weed Boards	ongoing
Riparian habitat enhancement at Yellowhawk Creek	Private/WDFW	ongoing
Spray winter range to control noxious weeds	ODFW	ongoing
Mill Creek flood control project enhancements	USACE	planning
Garrison Creek habitat enhancement	USACE	planning
Stream restoration at the College Place sewage treatment plant on Garrison Creek	College Place, WWCD, WW County	planning
Habitat enhancement on lower Mill Creek	Tri-State Steelheaders	planning
Construct 206 setback levees on the Walla Walla River	Milton-Freewater Water Control District/USACE	planning
Fish and habitat management planning	USFWS, WDFW	
Mill/Titus Creek levee setback	USACE/Walla Walla County	
Miscellaneous work on Mill Creek	FEMA/Umatilla County	
Fish and habitat management planning	USFWS/WDFW	
Habitat enhancement planning	WDFW	
Weed control around Cottonwood Creek	Blue Mountain Elk Initiative, ODFW, Umatilla County/ODFW	
Road closure program on Griffin Peak and Chase Mountain	USFS	

Project	Funding/Lead Agency	
areas		
Forage enhancement projects on Bennett Timber Company lands, Eckler Mountain, and the Rainwater Wildlife Area	RMEF, CTUIR	
Deer and elk habitat enhancement, and depredation prevention and mitigation on private land	ODFW	
Artificial Propagation		
Spring chinook salmon release	CTUIR, Walla Walla	2000
Trap adult steelhead on the Walla Walla River at Nursery Bridge Dam	ODFW, CTUIR	1992-1998
LSRCP steelhead mitigation and resident trout stocking	WDFW	1985-1999
Brown trout stocking	WDFW	1962-98
Develop local steelhead stock on the Touchet River	LSRCP/WDFW	ongoing
Management Coordination		
Settlement agreement with local irrigators	USFWS	2000
Flood hazard management planning	WDE/Walla Walla County	complete
Ski Bluewood road use permit	USFS	ongoing
Private land access	BLM	ongoing
North end sheep and goat grazing allotment	USFS	ongoing
South Fork Walla Walla River recreational use	BLM	ongoing
Tiger timber sale	USFS	ongoing
Bull trout recovery planning	Various/ODFW, USFWS	ongoing
Annual blue and ruffed grouse wing collection from hunters	ODFW	ongoing
Hunter check stations	ODFW, OSP	ongoing
Waitsburg Comprehensive Flood Plan covering the Touchet River and Coppei Creek	Waitsburg	Planning

Present Subbasin Management

Existing Management

Federal Government

Army Corps of Engineers

The USACE is responsible for planning, designing, building and operating water resources and other civil works projects. The Federal Water Pollution Control Act of 1972 gave the USACE authority to enforce section 404 of the Act dealing with discharge of dredged or fill material into waters of the U. S., including wetlands. Amendments to the Act in 1977 exempted most farming, ranching, and forestry activities from 404 permit requirements (Dana and Fairfax 1980). The USACE is also responsible for flood protection by such means as building and maintaining levies, channelization of streams and rivers (also for navigation), and regulating flows and reservoir levels.

Bureau of Reclamation

The primary activity of the USBR is providing irrigation water. The USBR is involved with water management and irrigation in the Walla Walla subbasin, as well as multiple use resource management on its lands and facilities, including recreation and wildlife conservation.

Bonneville Power Administration

The BPA is a federal agency established to market power produced by the federal dams in the Columbia River basin. As a result of the Northwest Power Act of 1980, BPA is required to spend power revenues to mitigate the damage caused to fish and wildlife populations and habitat from federal hydropower development. The BPA provides funding for fisheries enhancement projects to mitigate for the damage caused to the Imnaha River's fisheries from the completion of the four lower Snake River Dams. These funds are provided and administered through the LSRCP.

Bureau of Land Management

Lands administered by the BLM consist primarily of dry grasslands and desert. These lands are currently managed for multiple use under authority of the Federal Land Policy and Management Act (FLPMA) of 1976. Primary commodity uses of these lands are grazing and mining. Wildlife, wilderness, archaeological and historic sites, and recreation are also managed on BLM lands. The BLM is also responsible for mineral leasing on all public lands.

Columbia Basin Fish and Wildlife Authority

The CBFWA is made up of Columbia basin fish and wildlife agencies (state and federal) and the Columbia basin tribes. CBFWA's intent is to coordinate management among the various agencies and agree on goals, objectives, and strategies for restoring fish and wildlife in the Columbia basin. The Columbia River Fish Management Plan (CRFMP) is an agreement among the tribal, state, and federal parties with jurisdiction over Pacific salmon originating in the Columbia basin that provides procedures whereby the parties co-manage anadromous fish harvest, production, and habitat (Columbia River Inter-Tribal Fisheries Commission 1995). The CRFMP stems from the treaty fish rights lawsuit, *U.S. v. Oregon*. Management actions for the Walla Walla artificial propagation program are often included in *U.S. vs. Oregon* agreements.

Environmental Protection Agency

The EPA was formed in 1970 and administers the federal Air, Water, and Pesticide Acts. EPA sets national air quality standards, and important provision of which, requires states to prevent deterioration of air quality in rural areas below the national standards for that particular area (depending on its EPA classification). The EPA also sets national water quality standards (Total Maximum Daily Load or TMDL) for water bodies that the states must enforce. These standards are segregated into "point" and "nonpoint" source water pollution, with point sources requiring permitting. Although controversial, most farming, ranching, and forestry practices are considered nonpoint sources and thus do not require permitting by the EPA. The EPA provides funding through Section 319 of the CWA for TMDL implementation projects. Section 319 funds are administered in Washington by WDE and in Oregon by the ODEQ.

Farm Services Agency

The FSA was set up when the USDA was reorganized in 1994 to incorporate programs from several agencies. Functions similar to the FSA have been part of USDA programs since the 1930s. Federal farm programs are administered through local FSA offices. Farmers who are eligible to participate in these programs elect a committee of three to five representatives to review county office operations and make decisions on federal farm program application. Conservation program payments that FSA administers include CRP and the Environmental Quality Incentives Program. Technical assistance for these programs is provided by NRCS.

Natural Resource Conservation Service

The NRCS provides technical support to landowners to design and implement conservation practices that reduce soil erosion, improve water quality, and provide wildlife habitat. Programs include the following: CRP, Continuous Conservation Reserve Program, Wildlife Habitat Improvement Program, Environmental Quality Incentives Program, and Wetlands Reserve Program. The NRCS works closely with the Farm Service Agency as well as individual landowners.

National Marine Fisheries Service

The NMFS has ESA administration and enforcement authority for anadromous fish. NMFS reviews ESA petitions, provides regulations and guidelines for activities that affect listed species, and develops and enforces recovery plans for listed species in the subbasin. NMFS is also involved in primary research on anadromous and marine species to provide much of the knowledge required for fisheries management.

United State Fish and Wildlife Service

The USFWS administers the ESA for resident fish and wildlife species. The USFWS is also responsible for enforcing the North American Migratory Bird Treaty Act and Lacey Act (1900) to prevent interstate commerce in wildlife taken illegally. The USFWS distributes monies to state fish and wildlife departments raised through federal taxes on the sale of hunting and fishing equipment under the authority of the Pitman-Robertson Federal Aid in Fish and Wildlife Restoration Act (1937) and the Dingle-Johnson Act. The USFWS also manages a national system of wildlife refuges and provides funding that emphasizes restoration of riparian areas, wetlands, and native plant communities through the Partners in Wildlife Program.

The USFWS budgets for and administers the operation, maintenance, and evaluation of the LSRCP spring and fall chinook, steelhead, and rainbow trout programs in the Walla Walla subbasin. The LSRCP was authorized by the Water Resources Development Act of 1976, Public Law 94-587, to offset losses caused by the four Lower

Snake River dam and navigation lock projects. The WDFW operates LSRCP facilities in the Walla Walla subbasin and are co-managers with the CTUIR within the basin.

United States Forest Service

The USFS is responsible for the management of all National Forests and National Grasslands in the U. S. The multiple use mandate of the USFS was emphasized in the Multiple Use Sustained Yield Act of 1960. The forest planning process that has been in force for over the last 20 years was established under the Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 and National Forest Management Act (NFMA) of 1976. The USFS land allocation, management standards, and guidelines for the Walla Walla subbasin are specified in the Umatilla National Forest land and resource management plan (U. S. Forest Service 1990).

Tribes

The CTUIR is responsible for protecting and enhancing treaty fish and wildlife resources and habitats for present and future generations. Members of the CTUIR have federal reserved treaty fishing and hunting rights pursuant to the 1855 Treaty with the United States government. CTUIR co-manages fish and wildlife resources with state fish and wildlife managers and individually and/or jointly implements restoration and mitigation activities throughout areas of interest and influence in northeast Oregon and southeast Washington. These lands include but are not limited to the entire Walla Walla subbasin in which CTUIR held aboriginal title. CTUIR fish and wildlife activities relate to all aspects of management (habitat, fish passage, hatchery actions, harvest, research, etc.). CTUIR policies and plans applicable to subbasin management include the *Columbia Basin Salmon Policy* (Confederated Tribes of the Umatilla Indian Reservation 1995), *Wy-Kan-Ush-Mi Wa-Kish-Wit: Spirit of the Salmon* (Columbia River Inter-tribal Fish Commission 1996a, 1996b), and the CTUIR *Wildlife Mitigation Plan for the John Day and McNary Dams* (Childs et al. 1997).

State

Oregon Department of Environmental Quality

The ODEQ is responsible for implementing the Clean Water Act and enforcing state water quality standards for protection of aquatic life and other beneficial uses. The mission of the ODEQ is to lead in the restoration and maintenance of Oregon's quality of air, water and other environmental media. With regard to watershed restoration, the Department is guided by Section 303(d) of the Federal Clean Water Act and Oregon statute to establish TMDLs for pollutants and implement water quality standards as outlined in Oregon Administrative Rules 340-041. The ODEQ focuses on stream conditions and inputs and advocates for other measures in support of fish populations (Don Butcher, ODEQ, February 2, 2001).

Oregon Department of Fish and Wildlife

The ODFW is responsible for protecting and enhancing Oregon fish and wildlife and their habitats for present and future generations. ODFW co-manages fish and wildlife resources with CTUIR and jointly implements the BPA-funded Walla Walla River subbasin Salmon and Steelhead Production Plan. Fish and wildlife harvest by non-Indians in the Walla Walla River subbasin is the responsibility of ODFW. Habitat management for fish and wildlife is done collaboratively with private landowners, CTUIR, and public land management agencies.

ODFW policies and plans applicable to the subbasin include the Oregon Administrative Rules on wild fish management and natural production (Oregon Department of Fish and Wildlife First state agency

1990a, 1992a) and management plans for elk, mule deer, and cougar (Oregon Department of Fish and Wildlife 1990b, 1992c, 1993b). These plans present systematic approaches to conserving aquatic and wildlife resources and establishing management priorities within the subbasin.

Oregon Department of Forestry

The ODF enforces the Oregon Forest Practices Act (OFPA) regulating commercial timber projection and harvest on state and private lands. The OFPA contains guidelines to protect fish bearing streams during logging and other forest management activities that address stream buffers, riparian management, road maintenance, and construction standards.

Oregon Department of Transportation

The Oregon Department of Transportation (ODT) maintains highways that cross streams in the subbasin. Under the initiative of the Oregon Plan for Salmon and Watersheds, efforts to improve protection and remediation of fish habitat impacted by state highways are ongoing.

Oregon Division of State Lands

Oregon Division of State Lands regulates the removal and filling of material in waterways. Permits are required for projects involving 50 cubic yards or more of material. Permit applications are reviewed by the ODFW and may be modified or denied based on project impacts on fish populations.

Oregon Land Conservation and Development Commission

The Land Conservation and Development Commission in Oregon regulates land use on a statewide level. County land use plans must comply with statewide land use goals, but enforcement against negligent counties appears minimal. Effective land use plans and policies are essential tools to protect against permanent fish and wildlife habitat losses and degradation, particularly excessive development along streams, wetlands, floodplains, and sensitive wildlife areas.

Oregon Plan for Salmon and Watersheds

Passed into law in 1997, the Oregon Plan for Salmon and Watersheds outlines a statewide approach to ESA concerns based on watershed restoration and ecosystem management to protect and improve salmon and steelhead habitat in Oregon. The Oregon Watershed Enhancement Board facilities and promotes coordination among state agencies, administers a grant program, and provides technical assistance to local watershed councils and others to implement the Oregon plan.

Oregon State Police

The Oregon State Police patrols the subbasin to enforce laws and regulations designed to protect fish and wildlife. Specific area and resource protection action plans are developed each year in consultation with ODFW.

Oregon Water Resources Department

The Oregon Water Resource Department (OWRD) regulates water use in the subbasin. Water rights determine the maximum rate and volume of water than can legally be diverted. Oregon Administrative Rule for the Walla Walla subbasin outlines objectives for the management, use, and control of its surface and groundwater resources (Oregon Water Resources Department 1988). OWRD also acts as trustee for instream water rights issued to the state of Oregon and held in trust for the people of the state.

In conjunction with ODFW, OWRD established priorities for streamflow restoration in the Walla Walla River subbasin. OWRD ranked the opportunities and optimism for achieving meaningful streamflow restoration in each subbasin based on the availability and perceived effectiveness of several flow restoration measures. These included transfers and leases to instream uses, cancelled water rights, enforcement and monitoring, improved diversion methods, stream inventories, conservation planning, improved efficiencies, and measurement and reporting of use. By overlaying the identified need and opportunities for restoration, the state of Oregon has identified the subwatersheds where it will apply its resources toward achieving streamflow restoration.

Oregon Water Trust

Oregon Water Trust (OWT) is a private, non-profit group who negotiates voluntary donations, leases, or permanent purchases of out-of-stream water rights to convert to instream water rights in those streams where acquisition will provide the greatest potential benefits for fish and water quality. OWT entered into a 10-year lease with a Couse Creek water right holder in 1998. This lease provides over 2 cfs of flow in a critical steelhead spawning and rearing habitat area. The right is held in trust for the people of Oregon by the OWRD.

Washington Department of Ecology

The WDE’s mission is to protect, preserve, and enhance Washington’s environment and promote the wise management of air, land, and water for the benefit of current and future generations. The agency monitors and sets regulatory standards for water quality within the subbasin.

In addition to regulating water quality the WDE is responsible for water resource management, instream flow rule development, shoreline management, floodplain management, wetland management, and providing support for watershed management in the Walla Walla subbasin.

Washington Department of Fish and Wildlife

The WDFW is responsible for protecting and enhancing Washington fish and wildlife and their habitats for present and future generations. WDFW co-manages fish and wildlife resources with CTUIR and jointly implements the BPA-funded Walla Walla River Subbasin Salmon and Steelhead Production Plan. Management of the harvest of fish and wildlife by non-Indians in the Washington portion of the Walla Walla River subbasin is the responsibility of WDFW. Habitat management for fish and wildlife is done collaboratively with private landowners, CTUIR, and public land management agencies.

Washington Department of Natural Resources

The WDNR manages 2,394 acres of state land throughout the subbasin. These lands are generally located in sections 16 and 36 within each township. The main goal of the WDNR is to maximize monetary returns from state lands in order to fund school construction. This type of management often reduces the habitat value for wildlife on WDNR lands. The WDNR also enforces and monitors logging practice regulations on private lands.

Existing Goals, Objectives, and Strategies

Fish

The Walla Walla River subbasin has diverse populations of fish and wildlife that are of economic and ecological significance to the people of the states of Oregon and Washington and the Northwest and of special cultural significance to the Confederated Tribes of the Umatilla Indian Reservation and other treaty tribes. The general goal is to restore the health and function of the Walla Walla River ecosystem of ensure continued viability of these important populations. With the exception of adding Pacific lamprey, shellfish, and non-consumptive fish benefits, the following Walla Walla subbasin fish goals are taken from planning documents (Northwest Power Planning Council 1992; Columbia Basin Fish and Wildlife Authority 1999).

Goals

1. Protect, enhance and restore wild and natural populations of summer steelhead, bull trout, shellfish and other indigenous fish in the Walla Walla subbasin.
2. Reestablish runs of extirpated spring chinook and Pacific lamprey (CTUIR) into historically occupied habitat in the Walla Walla River subbasin.
3. Provide sustainable ceremonial, subsistence and recreational anadromous and resident fisheries; non-consumptive fish benefits such as cultural and ecological values.
4. Maintain genetic and other biological characteristics of indigenous populations and genetic viability of reintroduced populations.

Objectives

1. Achieve and maintain an average run of 5,650 (CTUIR entire basin), 1,500 (ODFW Oregon portion), and 3,150 (WDFW Washington portion) summer steelhead to the Walla Walla subbasin using a time target of the year 2015 (CTUIR) or earlier (Table 34).
2. Reestablish and maintain an average run of 5,500 spring chinook to the Walla Walla subbasin using a time target of the year 2020 or earlier (CTUIR and ODFW; Table 35).
3. Achieve and maintain self-sustaining populations and fisheries of pacific lamprey CTUIR), bull trout and other indigenous fishes in the subbasin using a time target of the year 2015 (CTUIR) or earlier.
4. Maintain LSRCP mitigation program and fisheries for summer steelhead and resident trout in the Washington portion of the Walla Walla subbasin.
5. Maintain warm water and other fisheries as appropriate without conflicting with indigenous fish needs (WDFW).

Table 34. Walla Walla River summer steelhead production objectives and fish disposition

Agency	Objective by Subbasin	Adult Returns			Disposition of Returns			
		Nat	Hat	Total	Nat Production	Broodstock	Harvest	Total
CTUIR	Oregon	1500	1000	2500	1500	80	920	2500
CTUIR	Washington	1500	1600	3150	1500	80	1520	3100
ODFW	Oregon	1500	0	1500	1500	0	0	1500
WDFW	Washington	1500[1]	1600	3150	1420	80	1600	3100

[1]Preliminary estimate

Table 35. Walla Walla River spring chinook production objectives and fish disposition (CTUIR and ODFW).

Location	Returned to WW Mouth			Disposition of Returns			
	Nat.	Hat.	Total	N. Prod.	Broodstock	Harvest	Total
Upp. MS/S.Fk.	3,000	2,500	5,500	3,000	500	2,000	5,500
Mill Creek	To be determined from adult outplanting results						
Touchet & tribs	To be determined from adult outplanting results						
Totals	3,000+	2,500+	5,500+	3,000+	500+	2,000+	5,500+

The above fish natural production, broodstock, and harvest objectives originated from the previously cited planning documents. Initial numbers were developed based on the best available fish production information during previous planning efforts. Where applicable, general rationale for adjustments or agency differences in Walla Walla adult return and disposition targets by species follow.

For steelhead, a natural production target of 3,000 has remained the same. In both states, agency and tribal fish disposition numbers differ because the CTUIR is planning on utilizing endemic stock hatchery-reared steelhead to spawn naturally as part of steelhead restoration efforts while WDFW and ODFW are not.

The CTUIR and ODFW changed the overall spring chinook basin target from 5,000 to the mouth to 5,500 to Oregon (upper mainstem and South Fork). This adjustment was based on observation of Umatilla program adult returns, natural production, harvest success and comparisons of habitat availability and quality between the two basins. Specific targets for Mill Creek and the upper Touchet River and tributaries are yet to be defined. CTUIR is hopeful that findings from adult outplanting efforts in these locations will help in development of restoration targets.

Strategies

Strategy 1. Protect, enhance and restore indigenous fish including federal and state threatened and sensitive fish species in the subbasin.

Action 1.1 Provide protection for federal and state threatened and sensitive fish species in all resource management plans.

Action 1.2 Enforce Federal, State, Tribal and local land use regulations designed to protect fish habitats.

Action 1.3 Increase enforcement of laws and fishing regulations pertaining to illegal take of fish (all life stages).

Action 1.4 Evaluate or refine methods to establish recovery goals, escapement goals and desired future conditions or other goals. Refine methods for determining carrying capacities for salmonids in streams within the basin to establish biologically sound restoration and target goals.

Action 1.5 Establish wild/natural fish goals for recovery, escapement, desired future condition and harvest implementation plans (WDFW).

Strategy 2. Protect, enhance or restore water quality to improve the survival, abundance and distribution of indigenous resident and anadromous fish.

Action 2.1 Reduce stream temperatures by restoring or enhancing riparian vegetation, floodplain function and increasing hyporheic and instream flows.

Action 2.2 Increase water quality monitoring and enforcement of existing regulations to maintain or enhance water quality. Use Clean Water Act, Section 401, Oregon Forest Practices Act and the Washington Fish and Forests regulations to protect and restore water quality and fish habitat.

Action 2.3 Complete the TMDL process and implement measures to remove streams from 303d listings under the Clean Water Act and improve water quality.

Action 2.4 Support timely updates and resource inventories related to local land use plans to prevent further development and degradation of floodplains, wetlands, riparian and other sensitive areas.

Action 2.5 Properly maintain, relocate, or eliminate forest, public, and private roads in riparian or other sensitive areas.

Action 2.6 Develop, implement and enforce provisions of an Oregon Walla Walla River Agricultural Water Quality Management Plan.

Action 2.7 Implement the Conservation Reserve Enhancement Program (CREP), Continuous Conservation Reserve Program (CCRP), Wetland Reserve Program (WRP) and other pertinent Federal, State, Tribal and local programs along riparian zones and in other sensitive areas.

Action 2.8 Monitor and evaluate efforts to improve water quality and utilize data to assist in management decisions.

Action 2.9 Monitor and evaluate efforts to improve water quality and utilize data to assist in management decisions.

Strategy 3. Protect, enhance and restore instream and riparian habitat to improve the survival, abundance and distribution of indigenous resident and anadromous fish.

Action 3.1 Complete the TMDL process and implement measures to remove streams from 303d listings under the Clean Water Act and improve water quality.

Action 3.2 Enforce federal, state, tribal and local land use regulations designed to protect fish habitats.

Action 3.3 In the short-term, plant native vegetation, construct pools and place large woody debris in streams to provide or increase channel complexity and cover for fish. Maintain operation and maintenance of projects already in place.

Action 3.4 Over the long-term, implement improvements to stream geomorphic features (sinuosity, width/depth ratio, pool frequency, depth and dimension, entrenchment, etc.) that will result in benefits to fish habitat quantity and quality.

Action 3.5 Over the long-term, restore riparian vegetation and adjacent valley bottom and upland vegetation to provide shade and result in the natural long-term recruitment of large woody debris into streams.

Action 3.6 Reduce sediment deposition in area streams by reducing erosion and sediment delivery to waterways.

Action 3.7 Improve watershed conditions to reduce man-induced increases of flood peak flows and duration to reduce instream substrate scour, deposition or movement.

Action 3.8 Improve floodplain function to improve stream channel stability, hyporheic flows and instream habitat diversity.

Action 3.9	Improve or eliminate stream fords and other substrate disturbances.
Action 3.10	Protect critical habitat to improve production and survival of indigenous fish. Continue to refine delineation of stronghold areas.
Action 3.11	Monitor and evaluate efforts to protect, enhance and restore instream and riparian habitats and utilize data to assist in management decisions.
Strategy 4.	Protect, enhance and restore instream flows to improve passage conditions and increase rearing habitat for anadromous and resident fishes.
Action 4.1	Continue to refine understanding of and/or determine location and timing of dewatered or flow limited stream reaches and prioritize them for instream flow restoration and enhancement activities.
Action 4.2	Conduct feasibility study to identify various opportunities to augment instream flows including Columbia River exchange and off-channel storage.
Action 4.3	Refine and/or determine flows needed for fish migration and rearing.
Action 4.4	Increase instream flows by lease and/or purchase of water rights.
Action 4.5	Increase stream flows by improving the efficiency of irrigation systems and use of conserved water for instream use.
Action 4.6	Increase monitoring of water use and instream flows. Use collaborative efforts or enforcement of existing regulations and water rights to increase available instream water.
Action 4.7	Investigate opportunities to allow water users to more easily transfer water for instream use and to provide adequate protection downstream and across state borders, which may require law changes or interstate agreements.
Action 4.8	Evaluate efforts to protect, enhance, and restore instream flows.
Action 4.9	Continue to refine knowledge of flow limited stream reaches and results of enhancement efforts to address remaining needs.
Strategy 5.	Restore or enhance fish passage for resident and anadromous upstream and downstream migrants.
Action 5.1	Continue to inventory and prioritize additional passage or screening needs within the basin.
Action 5.2	Modify or remove culverts, bridges, grade controls and water diversion structures as necessary to improve passage.
Action 5.3	Implement screening of all diversions (pump and gravity) to meet State and NMFS criteria. Achieve compliance with state screening and passage laws.
Action 5.4	Operate and maintain all fish passage facilities to ensure proper mechanical function.

Action 5.5 Monitor river conditions and operation of passage facilities to ensure that adequate passage exists and implement adjustments as necessary to ensure efficient passage.

Action 5.6 Where feasible, consolidate diversions to reduce the number of artificial passage situations leading to fish mortality.

Action 5.7 Continue trap and haul and salvage operations when necessary during low flow periods.

Action 5.8 Enforce state and federal fish passage regulations and requirements.

Strategy 6. Use artificial propagation to reintroduce Carson stock spring chinook into the Walla Walla subbasin to provide natural production and harvest.

Action 6.1 Construct hatchery and acclimation facilities necessary for production and release of 500,000 yearling smolts into historic spring chinook habitat (CTUIR).

Action 6.2 Continue experimental outplanting of out-of-basin surplus Carson stock spring chinook adults into the basin.

Action 6.3 Work with co-managers to complete and implement the Master Plan or HGMP for spring chinook reintroduction in the basin.

Strategy 7. Through artificial propagation, utilize local summer steelhead broodstock to enhance natural production and provide harvest opportunities (CTUIR).

Action 7.1 Operate broodstock traps to collect endemic steelhead adults at Nursery Bridge Dam (CTUIR) and Dayton conditioning pond (WDFW) for holding and spawning at existing facilities.

Action 7.2 Rear 100,000 steelhead smolts at Umatilla Hatchery for acclimation and release into historic habitat in the South Fork Walla Walla River subbasin (CTUIR).

Action 7.3 Design and implement a comprehensive study to assess the risks and benefits of supplementation activities in the subbasin to determine effectiveness of rebuilding natural steelhead while maintaining their genetic structure and long-term viability.

Strategy 8. Maintain the Lower Snake River Compensation Plan (LSRCP) harvest mitigation for steelhead and resident trout in the Washington portion of the basin.

Action 8.1 Continue hatchery production and releases of Lyons Ferry Hatchery (LFH) stock steelhead to provide harvest and recreational fishing opportunities.

Action 8.2 Modify LSRCP production programs as needed to minimize their potential effects on wild salmonid populations and be consistent with ESA concerns.

Action 8.3 Continue hatchery production and releases of rainbow trout in area ponds and lakes to provide harvest and recreational fishing opportunities.

Action 8.4 Continue to develop and phase into use of a local steelhead stock for the LSRCP hatchery programs.

Strategy 9. Monitor and evaluate hatchery programs to ensure they are successful and minimize adverse effects on listed or other indigenous species.

Action 9.1 Monitor and evaluate performance of reintroduced spring chinook salmon.

Action 9.2 Monitor and evaluate performance of summer steelhead reared at Umatilla Hatchery released in the South Fork Walla Walla River (CTUIR).

Action 9.3 Continue to monitor and evaluate the performance of the LSRCP program.

Action 9.4 Monitor and evaluate the health and disease status of adults and juveniles for all Walla Walla hatchery programs.

Action 9.5 Continue to monitor recreational and tribal fisheries in the basin, the contribution by hatchery programs and assess the effects of fishing seasons.

Strategy 10. Implement artificial propagation practices to maintain the genetic and biological integrity of supplemented stocks.

Action 10.1 Use IHOT genetics guidelines for broodstock selection, mating and rearing.

Action 10.2 When fish health and disease issues are identified, take appropriate remedial actions to maximize survival of affected fish and prevent spread to other natural and hatchery fish.

Strategy 11. Monitor genetic characteristics of salmonid populations.

Action 11.1 Continue baseline genetic monitoring and evaluation of indigenous populations in the subbasin.

Action 11.2 Initiate baseline genetic monitoring and evaluation of reintroduced populations in the subbasin.

Strategy 12. Monitor and evaluate the productivity, abundance, distribution, life history and biological characteristics of anadromous and resident fish, and relationship with instream and riparian habitat conditions within the subbasin to assess the success of management strategies.

Action 12.1 Operate, maintain and modify as necessary traps or adult fish counting facilities including Nursery Bridge Dam (Oregon), and Dayton Acclimation Pond (Washington) to enumerate adult returns, monitor migration timing and conduct biological sampling.

Action 12.2 Construct and operate additional sites as needed for trapping or counting facilities (e.g. Mill Creek).

Action 12.3 Conduct redd and carcass surveys to monitor adult salmonid spawning escapement.

Action 12.4 Conduct biological surveys to monitor and evaluate juvenile fish distribution, abundance, condition, habitat use, life history, etc.

Action 12.5 Operate smolt collection facilities or traps to monitor outmigration numbers, timing and survival.

Action 12.6 Use radio telemetry to examine migration routes, timing and fish passage effectiveness under varying flow conditions for bull trout, spring chinook and summer steelhead. In addition, passage at impediments, habitat use, life history patterns and spawning areas will be evaluated.

Action 12.7 Measure the quantity and quality of fish habitat, riparian habitat, and water quality in the basin.

Strategy 13. Assess the compatibility of maintaining warm water fisheries with conservation of indigenous salmonids (WDFW).

Action 13.1 Assess distribution, abundance and biological characteristics of non-indigenous fish within the basin.

Action 13.2 Evaluate non-indigenous fisheries.

Action 13.3 Develop a fishery management plan for non-indigenous fish.

Action 13.4 Monitor the fishery and adjust the plan, regulations, etc. as necessary.

Strategy 14. Conduct initial population investigations and develop a restoration plan for Pacific lamprey (CTUIR).

Action 14.1 Collect lamprey population data from ongoing natural production monitoring projects in the basin.

Action 14.2 Utilize knowledge from Action 9.1 and findings from the Umatilla lamprey restoration program to develop lamprey restoration actions for the Walla Walla subbasin.

Strategy 15. Improve out-of-basin survival of migratory fish to increase juvenile survival and adult returns to the Walla Walla subbasin (specific details in mainstem summaries).

Action 15.1 Implement or support projects to reduce mortality related to Columbia River fish passage, water quality, predation and estuary conditions.

Action 15.2 Enforce State and Federal fish passage requirements and water quality standards in the mainstem Columbia River.

Action 15.3 Conduct monitoring of migratory fish to determine survival rates, timing and distribution outside the basin.

Wildlife

Goals

1. Achieve and sustain levels of habitat species productivity to mitigate for wildlife and wildlife habitat losses caused by the development and operation of the hydropower system (Northwest Power Planning Council 1992).
2. Maintain wildlife diversity by protecting and enhancing populations and habitats of native wildlife at self-sustaining levels throughout natural geographic ranges (Oregon Department of Fish and Wildlife et al. 1993).
3. Protect, enhance, restore, maintain and/or increase PHS wildlife populations to viable or management objective levels for ecological, social, recreational, subsistence, and aesthetic purposes within the subbasin (Paul Ashley, WDFW, personal communication, February 2001)
4. Restore and maintain self-sustaining populations of species extirpated from the state or regions within the state, consistent with habitat availability, public acceptance, and other uses of the lands and waters of the state (Puchy and Marshal, 1993).
5. Monitor the status of wildlife populations as needed for appraising the need for management actions, the results of actions, and for evaluating habitat and other environmental changes (Oregon Department of Fish and Wildlife et al. 1993).
6. Provide recreational, educational, aesthetic, scientific, economic and cultural benefits derived from Oregon’s diversity of wildlife (Puchy and Marshal, 1993).
7. Ensure long-term maintenance of healthy populations of native landbirds (Altman and Holmes 2000a, 2000b)
8. Identify, establish standards, and implement management measures required for restoring threatened and endangered species, preventing sensitive species from having to be listed as threatened or endangered, and maintaining or enhancing other species requiring special attention (Puchy and Marshal, 1993).
9. Reintroduce species or populations where they have been extirpated (Puchy and Marshal, 1993).

Forest Habitat Objectives

1. Restore and maintain late seral ponderosa pine habitat.
2. Maintain and restore habitat connectivity across forest landscapes.
3. Increase heterogeneity in species composition and structural stage.
4. Increase snag and down wood density.
5. Restore fire as an ecological process.

Strategies

1. Design vegetative management strategies that are consistent with historical succession and disturbance regimes.
2. Increase the abundance of shade-intolerant species such as western larch.

Shrubsteppe Habitat Objectives

1. Acquire high quality privately owned shrubsteppe habitats and move them to protected status (Kagan et al. 2000).
2. Protect and enhance remaining shrubsteppe habitats.
3. Pursue protected status for private lands in the North and South Forks of the Walla Walla River.
4. Initiate actions to enhance size and connectivity of existing quality shrubsteppe patches (i.e., reduce fragmentation).
5. Institutionalize a policy of "no net loss" of shrubsteppe habitat (i.e., discourage loss and conversion of habitat, but when unavoidable, mitigate with equal or greater restoration efforts).
6. Minimize further degradation of shrubsteppe habitat (e.g., reduce, eliminate or improve livestock grazing practices).
7. Maintain cryptogamic crusts where they occur, and seek ecologically appropriate sites for restoration to ensure proper functioning native plant communities.
8. Maintain sites dominated by native vegetation and initiate actions to prevent infestations of exotic vegetation.
9. Improve habitat for grassland-associated wildlife species by managing non-native grasslands (e.g. agricultural lands, inactive grasslands such as CRP and fallow fields) as suitable habitat where biologically appropriate (i.e., where viable landbird populations can be maintained).
10. Expand shrubsteppe focal species distribution and abundance by establishing Shrubsteppe Bird Conservation Areas (SSBCAs).
11. Implement land use practices that are consistent with growth of native plants and forbs.

Riparian and Wetland Habitat Objective

1. Protect and enhance riparian and wetland habitat

   Strategies
   1. Institutionalize a policy of "no net loss" of riparian and wetland habitat (i.e., discourage loss and conversion of habitat, but when unavoidable, mitigate with equal or greater restoration efforts)
   2. Initiate actions to increase high quality riparian and wetland habitat through restoration of degraded riparian habitat
   3. Maintain all tracts of contiguous cottonwood gallery forest >50 acres, regardless of understory composition.

   4. Maintain multiple vegetation layers and all age classes (e.g., seedlings, saplings, mature, and decadent plants) in riparian woodlands.
   5. Initiate actions to increase size (width and length) and connectivity of existing riparian patches (i.e., reduce fragmentation) through restoration and acquisition efforts.

6. Expand riparian focal species distribution and abundance throughout the Columbia Plateau by establishing Riparian Bird Conservation Areas (RBCAs) (Altman and Holmes 2000a, 2000b).
7. Leave upland buffer zones of uncultivated and unharvested areas adjacent to riparian habitats to protect the stream and increase habitat for area-sensitive bird species.
8. Limit grazing intensity to levels to maintain the integrity of native species composition and health.

Unique Habitats Objectives

1. Protect and enhance remaining aspen clones
2. Protect and enhance remaining juniper woodlands

Strategies

1. Maintain all snags and initiate active snag creation (e.g., fungal inoculation, topping) where snags are limiting and restoration leading to recruitment of saplings is underway.
2. Eliminate or modify grazing to ensure succession and recruitment of young aspen.
3. Where starling competition for nest cavities is significant, enact starling control measures.
4. Fence aspen clones to protect regenerating aspen.
5. Identify, retain and protect mature and old-growth juniper trees in steppe habitats.

Washington Ground Squirrel Objective

Establish six viable colonies:15+ squirrels/colony over 5 years.

Strategies

1. Inventory existing populations in six-month period Inventory suitable ground squirrel habitat in a six month period.
2. Protect exiting habitats.
3. Trap and transplant Washington ground squirrels into historic or existing habitats.

Extirpated Species

Sharp-Tailed Grouse Objective

Reestablish viable populations of sharp-tailed grouse to suitable habitats in the subbasin

Strategies

1. Move sharp-tailed grouse leking, brooding, and wintering habitats into protected status.
2. Increase suitable sharp-tailed grouse habitat.

3. Reintroduce sharp-tailed grouse to suitable protected habitats in the subbasin (Crawford and Coggins 2000).
4. Improve habitat quality of CRP lands to make suitable for sharp-tailed grouse including incorporating abundant legumes within CRP.
5. Use artificial leks to establish breeding sites.

Bighorn Sheep Objectives

1. Reintroduce and maintain healthy bighorn sheep populations.
2. Improve bighorn sheep habitat as needed and as funding becomes available.
3. Provide recreational ram harvest opportunities when bighorn sheep population levels reach 60 to 90 animals.

Strategies

1. Reduce domestic sheep/bighorn sheep conflicts in primary Rocky Mountain bighorn sheep habitat.
2. Work with land management agencies and private individuals to minimize contact between established bighorn sheep herds and domestic or exotic sheep.
3. Maintain geographical separation of California and Rocky Mountain subspecies.
4. Bighorns of questionable health status will not be released in Oregon.
5. Maintain sufficient herd observations so as to ensure timely detection of disease and parasite problems.
6. Monitor range condition and use along with population characteristics.
7. Consider land purchase in order to put such land into public ownership.

Managed Species

Black Bear Objectives

1. Determine black bear population characteristics.
2. Determine black bear harvest levels.
3. Maintain black bear populations at socially sustainable levels.

Strategies

1. Determine black bear population characteristics.
2. Determine black bear harvest levels.
3. Implement or cooperate in research to learn more about black bear ecology in Oregon, develop accurate population estimates and provide a measurement of population trend.
4. Obtain improved harvest information through use of combination report card/tooth envelope.
5. Monitor black bear harvest and implement harvest restrictions if necessary.
6. Develop an educational program to alert black bear hunters of the need for improved black bear population information.
7. If necessary, initiate mandatory check of harvested black bear.
8. Continue to work with other agencies and private landowners in solving black bear depredation problems.

9. Explore the possibility of using sport hunters for damage control.

Cougar Objectives

1. Continue to study cougar population characteristics as well as the impact of hunting on cougar populations.
2. Document and attempt to eliminate potential future human-cougar conflicts.
3. Manage cougar populations through controlled hunting seasons.
4. Manage deer and elk populations to maintain the primary prey source for cougar.

Strategies

1. Determine black bear population characteristics.
2. Determine black bear harvest levels.
3. Continue to update and apply population modeling to track the overall cougar population status.
4. Continue mandatory check of all hunter-harvested cougar and evaluate the information. collected on population characteristics for use in setting harvest seasons.
5. Continue development of a tooth aging (cementum annuli) technique.
6. Provide information to the public about cougar distribution, management needs, behavior, etc.
7. Consider additional hunting seasons or increased hunter numbers in areas where human-cougar conflicts develop.
8. Manage for lower cougar population densities in areas of high human occupancy.
9. Continue to allow private and public landowners to take damage-causing cougar without a permit.
10. Encourage improved livestock husbandry practices as a means of reducing cougar damage on domestic livestock.

Mule Deer Objectives

1. Maintain healthy populations of mule deer in the subbasin
2. Maintain hunter opportunity and regulate harvest

Strategies

1. Set management objectives for buck ratio, population and fawn:doe ratio benchmark for each hunt unit and adjust as necessary.
2. Antlerless harvest will be used to reduce populations, which exceed management objectives over a two or three year period.
3. Harvest tag numbers are adjusted to meet or exceed objectives within 2-3 bucks/100 does.
4. Population trends will be measured with trend counts, number of deer damage incidents, and harvest data.
5. Move heavily used critical winter range to protected status, managed for optimum big game winter habitat.

Elk Objectives

1. Determine black bear population characteristics.
2. Maintain healthy Rocky Mountain elk populations.
3. Maintain, enhance, and restore elk habitat.
4. Minimize conflicts between wintering wild ungulates and commercial agricultural activities .
5. Enhance consumptive and non-consumptive recreational uses of Oregon's elk resource.

Strategies

1. Determine black bear population characteristics.
2. Protect Oregon's wild elk from diseases, genetic degradation, and increased poaching which could result from transport and uncontrolled introduction of cervid species.
3. Maintain populations of wild ungulates at management objectives (Oregon Department of Fish and Wildlife 1990b;1992c).
4. Ensure both adequate quantity and quality of forage to achieve elk population management objectives in each management unit.
5. Ensure habitat conditions necessary to meet population management objectives are met on critical elk ranges.
6. Maintain public rangeland in a condition that will allow elk populations to meet and sustain management objectives in each unit.
7. Move heavily used critical winter range to protected status, managed for optimum big game winter habitat (Oregon Department of Fish and Wildlife 1992c).
8. Increase forage quality and quantity in big game winter range (Oregon Department of Fish and Wildlife 1992c).
9. Increase bull age structure and reduce illegal kill of bulls while maintaining recreational management objectives.
10. Establish population models for aiding in herd or unit management decisions.
11. Adequately inventory elk populations in all units with significant number of elk.

Game Birds Objectives

1. Maintain healthy game bird populations
2. Provide recreational, aesthetic, educational, and cultural benefits from migratory game birds, other associated wildlife species, and their habitats

Strategies

1. Establish an Oregon Migratory Game Bird Committee to provide management recommendations on all facets of the migratory game bird program.

2. Use population and management objectives identified in Pacific Flyway Management Plans and Programs.
3. Develop a statewide migratory game bird habitat acquisition, development, and enhancement plan based on flyway management plans, ODFW Regional recommendations, and other state, federal, and local agency programs.
4. Implement a statewide migratory game bird biological monitoring program, including banding, breeding, production, migration, and wintering area surveys based on population information needs of the flyway and state.
5. Develop a statewide program for the collection of harvest statistics.
6. Prepare a priority plan for research needs based on flyway management programs.
7. Annually prepare and review work plans for wildlife areas that are consistent with policies and strategies of this plan.
8. Regulate harvest and other uses of migratory game birds at levels compatible with maintaining prescribed population levels.
9. Eliminate impacts to endangered, threatened, or sensitive species.
10. Provide a variety of recreational opportunities and access, including harvest and viewing opportunities.
11. Provide assistance in resolving migratory game bird damage complaints.

Research, Monitoring, and Evaluation Activities

While some BPA-funded monitoring projects began as early as 1986, most monitoring and evaluation activities took place after 1995. Most of the work has been associated with assessing stream habitat and the natural production of lamprey and salmonids. There are currently no BPA-funded hatchery programs that release smolts into the Walla Walla subbasin so there have not been any artificial production evaluations funded by BPA. Current monitoring and evaluation activities are critical to current and developing restoration activities and include the following:

- surveys to determine the current distribution, abundance and densities of lamprey and salmonids;
- habitat surveys to determine flows, temperature, channel morphology and riparian condition;
- a radio telemetry project to evaluate bull trout and steelhead passage at the irrigation diversions and other obstacles and to determine migration timing and spawning areas;
- spawning surveys to evaluate the spawning of adult hatchery chinook out-planted into natural production areas;
- the characterization of steelhead/rainbow genetics from populations from nine major tributaries/areas of the Walla Walla subbasin.

Research, monitoring, and evaluation activities within the Walla Walla subbasin that are used to compliment fish and wildlife projects are provided in Table 36 and Table 37.

Table 36. BPA-funded Columbia River Basin Fish and Wildlife Program research, monitoring, and evaluation activities within the Walla Walla River subbasin. (Columbia Basin Fish and Wildlife Authority 1999; Pacific States Marine Fisheries Commission 2001; Bonneville Power Administration and Northwest Power Planning Council 1999; Glen Mendel, WDFW, personal communication, January 2001; Allen Childs, CTUIR, personal communication, February 2, 2001)

Project	BPA #	Sponsor	Duration
Restoration and research of Pacific lamprey	9402600	CTUIR	1995-1999
Monitor and evaluate wildlife mitigation projects in the Rainwater Wildlife Area	20082	CTUIR	2000-2005
Monitor and evaluate the natural production, distribution, abundance and genetics salmonids	20127	CTUIR	2000-2004
Watershed habitat and salmonid fish stock assessment in the WA portion of the Walla Walla subbasin	901100	WDFW	1999-2002
N. E. Oregon artificial production and supplementation planning	8805305	ODFW	1997-1999
Assess adult salmon and steelhead passage at the Walla Walla River mouth	9204101	USACE	1996
Determine status, life history, genetic, habitat needs, and limiting factors for bull trout in the South and North Fork Walla Walla, Mill and Pine Creeks	9405400	ODFW, OS Systems	1994-1997
Identify resident fish species population density and overlap by habitat type in the Wolf Fork and Mill Creek	9005300	WDFW	1991-1992
Model and gather data at the Dayton Pond to standardize fish health monitoring	8601300	WDFW	1986-1987, 1989
Survey the Walla Walla Pond as a potential site for possible hatchery or acclimation pond sites	8608200	USFWS	1986-1987, 1989
Monitor fish health in Dayton Pond	8601300	WDFW	1986-1987, 1989

Table 37. Non BPA-funded Columbia River Basin Fish and Wildlife Program research, monitoring, and evaluation activities within the Walla Walla River subbasin. (Robert Gordon, Walla Walla City Water Division Manager, personal communication, December 7, 2000; Tim Bailey, ODFW, personal communication, December 29, 2000; Glen Mendel, WDFW, personal communication, January 3, 2001; Mark Kirsch, ODFW, personal communication, January 11, 2001; Ben Tice, USACE, personal communication, January 31, 2001; Don Butcher, ODEQ, personal communication, February 2, 2001).

Project	Funding/Lead Agency	Status
Limiting factors report draft required by WA state legislature to compile information about the WRIA	WCC	2000
Bull trout recovery plan draft	USFWS, ODFW	1999-2000
Mill Creek Master Plan report on flood control and enhancement for warm water fish	USACE	1995
Bull trout surveys in upper Mill Creek and North Fork Touchet River	USFS	1995-1998
Special report on blue grouse in NE OR	ODFW	1995
Habitat assessment surveys in forest lands on upper Mill Creek, Walla Walla and Touchet Rivers	USFS	1987
Collection of stream habitat and fish information for use in the HSI model and IFIM work	USACE, USFWS, WDG	1981
Identify and collect natural resource data in the Walla Walla River watershed	CTUIR, CCCD, CEEd	1998-2000
Touchet water quality studies	CCCD/CEEd	ongoing
Assess project impact	FEMA/Walla Walla County	ongoing
Annual blue and ruffed grouse sex, age, and hatch date analysis	ODFW	ongoing
Annual harvest reports for pronghorn, bear, cougar, deer, elk, waterfowl, and upland game birds	ODFW	ongoing
Annual inventory of trend and production data for upland game birds, deer, and elk	ODFW	ongoing
Mount Emily elk herd delineation wildlife research report	ODFW	ongoing
Annual mule deer fall herd composition counts	ODFW	ongoing
Annual mule deer and elk spring composition counts	ODFW	ongoing
Annual brood counts	ODFW	ongoing
Winter raptor surveys	ODFW	ongoing
Mill Creek flood control project operations and maintenance	USACE	planning
Population modeling for both mule deer and elk populations	ODFW	
Watershed assessment report	Various/CTUIR, CEEd	
Upriver monitoring	OWRD	
Monitor and evaluate groundwater	Walla Walla College	
Limiting factors assessment	WCC	
Pre/Post project assessments	CCCD/WDFW	
Monitoring and evaluation	Whitman College	
Walk the Stream program	WWCD	
Student monitoring	WWCD	
Water quality assessment	OWEB/WWBWC	
Watershed assessment	Various, CCCD	

Project	Funding/Lead Agency	Status
Continuous temperature monitoring	ODEQ	
Water quality chemistry	ODEQ	
Morphologic surveys	ODEQ	
Infrared remote sensing	ODEQ	
GIS studies	ODEQ	
Stream simulations leading to temperature prediction	ODEQ	
Develop relationships between upland and bank erosion and instream turbidity and suspended solids	ODEQ	
Write plans in winter range, grassland, and shrubsteppe areas to establish native habitats for either deer and elk winter range or sharp-tailed grouse habitat needs	ODFW, NRCS	
Irrigation diversion inventory	OWRD, UC, NRCS, OWEB, WWBC	

Statement of Fish and Wildlife Needs

Fish and wildlife managers in the Walla Walla subbasin continue to seek solutions to resolve problems affecting the productivity, stability, and perpetuity of natural resources. The first step in accomplishing this task is to identify factors known to limit the productivity of the resource. Upon their definition, resource specialists are able to prescribe specific strategies or actions needed to rectify or adjust the factor.

Lead management agencies in the subbasin have a common goal of restoring and/or stabilizing native fish, wildlife and plant species. Given the condition and number of many areas of critical concern, however, the process will likely take an appreciable amount of time before noticeable gains are made. For instance, fisheries managers have identified the need to rectify flow and temperature problems in portions of the subbasin for years and have made considerable gains, although these factors continue to persist. Similarly, wildlife managers have continually recognized the need to improve habitat connectivity, reduce invasion of exotic species, and restore structural complexity of vegetation types, yet still recognize these problems to be among the greatest threats to species propagation. Core refugia for plant and animal species in the Walla Walla exists, albeit at reduced levels from historic conditions. Conservation and expansion of these areas is a common need recognized by both fish and wildlife managers. Specific needs for fish and wildlife managers are discussed below.

Fish

Fish needs are summarized in Table 38.

Table 38. Fisheries resources management needs in the Walla Walla subbasin.

Needs	*Reference from this document*		*Other References*
	Limiting Factor	Strategy/Action	
Improve Streamflows	Table 25 App. D, J	• 4.4-4.8	USACE 1997; WDE 2000; USBR 1999; Mendel 1981, 1999; Van Cleve and Ting 1960; CTUIR & ODFW 1990; CBFWA 1999; Kuttel 2000; Hanson and Mitchell 1977; CRITFC 1996
Improve Stream Temperatures	Table 25 App. D, J	• 1.1-1.3 • 2.1-2.7	USACE 1977; Mendel et al. 2000; CTUIR & ODFW 1990; WWBWC 2000; WDOE 2000; Buchanan et al. 1997; Mendel and Taylor 1981; Mendel et al. 1999; Hunter and Crop 1975; Leigh and Phelps 1985; Mendel et al. 2001; Kuttel 2000; CBFWA 1999; CRITFC 1996
Address Passage Impediments	Table 25 App. D, J	• 5.2-5.8	PDMFC 2001; Hunter and Crop 1975; Ebasco Services & SP Cramer & Assoc. 1992; Zimmerman 1993; USACE 1997; OSGC 1963; CRITFC 1996; Legih & Phelps 1985; Mendel et al. 1995, 2000, 2001; Kuttel 2000; CBFWA 1999; CRITFC 1996
Improve Riparian Habitats	Table 25 App. D, J	• 1.1-1.3 • 2.1-2.7 • 3.1-3.9	USACE 1977; Mudd 1975; Kuttel 2000; Northrop 1998a, 1998b; Cleveland et al. 1975; USFS & BLM 2000; CRITFC 1996; CBFWA 1999; CRITFC 1996
Improve Instream Habitat Quality and/or Diversity	Table 25 App. D, J	• 3.1-3.9	Kuttel 2000; Northrop 1998a, 1998b; WDNR 1998; CBFWA 1999; CRITFC 1996
Reduce Sediment Inputs	Table 25 App. D, J	• 1.1-1.3 • 2.2-2.8 • 3.1-3.9	USACE 1997; Leigh and Phelps 1985; Pacific Groundwater Group 1995; Mapes 1969; WDNR 1998; CBFWA 1999; CRITFC 1996
Protect Stronghold Habitats	Table 25 App. D, J	• 3.10	Buchanan et al. 1997 CBFWA 1999; CRITFC 1996
Law Enforcement for Protection of Fish and Wildlife and their habitats	Table 25	• 1.2-1.3 • 2.2 • 3.2 • 4.6 • 5.8 • 15.2	CRITFC 1996

Needs	Reference from this document		Other References
	Limiting Factor	*Strategy/Action*	
Increase Adult Spawners (parental base)	Table 25 App. K	All strategy/actions listed above plus • 6.1-6.2 • 7.1-7.2 • 10.1-10.2	CRITFC 1996
Increase SARs (smolt-to-adult returns)	Table 25 App. K	• 10.1-10.2 • 15.1-15.2	CRITFC 1996
Address Research Monitoring &Evaluation and Data Gaps	Table 25	• 1.4-1.5 • 2.9 • 3.11 • 4.1-4.3 • 4.9 • 5.1 • 6.3 • 7.3 • 9.1-9.5 • 11.1-11.2 • 12.1-12.7 • 13.1-13.4 • 14.1-14.2 • 15.3	CBFWA 1999; CRITFC 1996

Improve Stream Flows

Populations of salmonid fish in the Walla Walla subbasin have been severely impacted by low stream flows due to out-of-stream uses. These impacts have occurred for more than 100 years and continue today. Data collected in 1935-1936 and summarized by Van Cleve and Ting (1960) reported that "it would be practically impossible for spring chinook salmon to ascend the river under the present system of water use." As a result of these activities, spring chinook salmon indigenous to the Walla Walla River were driven to extinction. Today, summer steelhead, bull trout, and various other native aquatic species continue to endure these practices.

The Bi-State Policy Group as led by Washington State representative Dave Mastin identified the Walla Walla River at Tumalum, Mill Creek at Wilbur Avenue, Cottonwood Creek at Powerline Road, Dry Creek at Dixie, and the South Fork of the Touchet River mouth as in immediate need of improved streamflow. This list represents a best estimation of professional and local judgment. Appendix J includes observed flows at each of these locations in 2000 and goals for 2001. The Bi-State Policy Group is currently developing short-term solutions in these areas. Examples include lease of water rights, voluntary irrigation conservation, and use timing.

Imposing actions for the take of bull trout under the ESA prompted the Walla Walla, Hudson Bay, and Gardena Farms Irrigation Districts to sign an Interim Agreement with USFWS in 2000. This agreement among other things required the districts to leave a minimum flow of 13 cfs in the mainstem Walla Walla River past Nursery Bridge (including Tumalum) and 10 cfs past Burlingame Dam for the summer of 2000. These flows proved helpful although not sufficient to meet the needs of salmonids species in these reaches. The surface flow was ultimately lost subsurface and to evaporation in the area of Tumalum Bridge leaving a significant reach dewatered during the summer months. Further negotiations with the Districts are expected to occur in 2001. The flow needs in this section of the river for salmonids are not known yet, although it is felt that at least double the amount left in 2000 will be necessary.

In 1997, the USACE completed the Walla Walla River Watershed Reconnaissance Report. This comprehensive document explores long-term meaningful answers that meet the needs of both aquatic species and agriculture in the basin. Possible solutions resulting from this document include off-channel storage, Columbia River pumping directly to irrigation district head gates, conservation through improved delivery systems and purchase of water rights from willing sellers. At this time, further federal funding is needed to take these actions onto the feasibility stage.

Beyond the needs mentioned above, further actions necessary to meet flow requirements for salmonids in the basin include education, municipal, industrial, and farm conservation practices. Efforts to restore floodplain/riparian function and thus bank storage of water should continue. The WDE and OWRD must develop a clear understanding of all water users, time of use, and closely monitor and enforce water law. Whenever possible, water rights from willing sellers should be purchased. Where out-of-stream uses are causing low flow problems, attempts should be made to mitigate these problems. One possible solution is acquisition of water rights. Oregon's Instream Water Rights Law allows water right holders to donate, lease, or sell some or all of their water right for transfer to instream use.

Improve Stream Temperatures

Excessively high stream water temperatures are a basin-wide problem, as indicated by the number of streams listed for temperature on the 303(d) list (Table 5). Elevated water temperatures are a result of anthropogenic changes in the basin. Primary causes for elevation in stream temperature are loss of shade producing vegetation, reduced stream flows, reduced hyporheic flows, loss of effective floodplain function and changes in stream channel geomorphology. Primary short-term areas of need for salmonid restoration activities include the mainstem Umatilla from the confluence of Meacham Creek to the mouth (excluding the reach positively influenced by the inflow of cool water released from McKay Reservoir), Meacham Creek from the mouth to headwaters, and Birch Creek from the mouth to headwaters. Ongoing activities to restore riparian vegetation and improve stream channel and floodplain form and function should be continued. Efforts to improve streamflows through water exchanges and through lease or purchase of out-of-stream water rights for transfer to instream should be accelerated if possible.

Scientific investigation and characterization is needed to identify the location and effect of ground water input, tributary input, cold water habitat, and temperature profiles as they relate to cold-water refugia. These efforts will allow managers to target areas in need of mitigation and/or protection under state authority. The most effective methodology to rapidly produce this data over large geographical expanses is the Forward Looking Infrared Radiometry (FLIR) technology.

Address Passage Impediments

Adult and juvenile passage impediments are a primary reason for salmon extinction and depressed steelhead populations in the Walla Walla subbasin and, to an unknown extent, are affecting lamprey and bull trout populations. The U.S. Army Corps of Engineers (1997) identified 61 structures in the basin which provide some level of impediment for fish passage. Many more exist in smaller tributaries or were not identified in that report. These passage impediments are predominantly related to diversion structures, with the exception of Mill Creek where many impediments are associated with flood control structures. Mitigation of these impediments has just begun in recent years.

In the area of upstream passage, two decommissioned dams have been removed, the ladder at Burlingame Dam has been upgraded, and a new ladder is under construction at Nursery Bridge Dam. Other adult passage impediments have also been identified, most notably at Hofer Dam on the lower Touchet River and at a number of locations in Mill Creek. An inventory of upstream passage impediments needs to be conducted, especially in the smaller tributary areas.

To improve downstream passage, new fish screen systems have been constructed on the mainstem at the two largest diversions in the basin. New or upgraded screens have also been installed at a number of smaller diversions, primarily in the Oregon portion of the basin. Two ditch consolidation/screening projects on the mainstem and a new screen system for the City of Walla Walla water supply intake on Mill Creek are in the planning stages. Most of the remaining gravity diversions in the basin have screens in disrepair, which do not meet current NMFS screening criteria, or are unscreened. Most of the larger diversions that fall into these categories have been identified for future improvements. However, many of the smaller diversions have not yet been identified for upgrades.

It is unknown as to what extent pump diversions have been screened in the basin. Efforts are currently underway to begin assessing the number of pump diversions and the screening situation. A comprehensive inventory of pump and gravity diversions in both the mainstem and tributaries needs to be conducted in order to assess future screening requirements.

Structural improvements at both ladder and screen sites is only one aspect of a successful passage program. If structures are not properly maintained or operated within established criteria, then limited or no passage benefits are expected from the improvements. Comprehensive operation and maintenance programs need to be implemented to meet these needs.

Improve Riparian Habitats

Riparian vegetation is a critical component of a stable, functioning stream ecosystem. Degradation of riparian vegetation communities leads to unraveling of both physical and biological processes. Riparian vegetation provides multiple benefits, including stream bank stability, stream channel shading, insect drop, organic matter for terrestrial and aquatic insects, thermal cover for wildlife, nesting and roosting areas for song birds, and recruitable instream wood. Mudd (1975) estimated that only 37% of the Touchet River riparian zone is currently vegetated. Along the Oregon portion of the Walla Walla River, 70% of the existing riparian zone is in poor condition (Water Resources Commission 1988, cited in U. S. Army Corps of Engineers 1997).

Activities to improve riparian habitat should continue, particularly at or upstream of reaches currently marginal for survival of salmonid fish. Riparian improvements in these areas may over time dramatically expand available rearing and ultimately elevate juvenile survival and outmigration. Stream buffers, whether implemented through voluntary long-term lease or farm programs, are urgently needed in cropland zones to meet the needs of both salmonid fish and Clean Water Act objectives. Livestock exclusion through fencing, off-channel watering, native revegetation, bioengineering, noxious weed control, and purchase of habitats critical to salmonid fish should continue. Fish managers should at all times continue landowner education and cooperation. County zoning laws must fully recognize and protect sensitive riparian habitats.

Improve Instream Habitat Diversity

Intensive land uses throughout the Walla Walla River subbasin have negatively effected watershed function, altered natural channel and floodplain form, and nearly eliminated most riparian zones. Many streams have been straightened resulting in channel degradation, incision, and loss in available rearing potential. Other outcomes have included streams losing their bank strength, over-widening and extending laterally. This has resulted in large, unstable gravel bars predominated by riffle habitat and elevating stream temperatures.

Contrary to popular belief, diverse stream channels are often the most stable during high flow events, acting as biological sponges of sediment and out-of-bank water. Stream meander increases stream length, elevating rearing capacity and slowing water velocities and resultant bank erosion and sediment input. Meander promotes bank storage of water leading to diverse and abundant growth of riparian vegetation. Large woody debris and organic material recruited from vegetated corridors provides holding areas for adult fish, concealment for juveniles, and a constant source of food for macroinvertebrates.

To meet the needs of salmonid fish, it is important to mimic riverine conditions known to be of high production value to these fishes. Whenever possible, floodplains free of constraint, fully vegetated riparian corridors, and stream meander are imperative. Landowner education and continued funding for farm programs such as the Conservation Reserve Enhancement Program are also necessary. Where naturally present, large woody debris should be encouraged. Channel forming stream flows should as close as possible follow natural flow regimes. Strict county zoning plans and enforcement are needed to halt all further expansion into the critically remaining riparian corridors.

Reduce Sediment Inputs

Many streams in the Walla Walla subbasin have excessively turbid waters and high percentages of fine sediment in spawning substrates. These conditions are notable in the lower Touchet, Lower Dry, and Pine creeks, all of which have several inches to several feet of sediment covering the channel bottom (G. Mendel, WDFW, personal communication, February 2001). The infrequent but intense localized rain storms, coupled with the character, mobility and exposure of native soils, results in high loads of sediment delivered to stream channels (G. Mendel, WDFW, personal communication, February, 2001). Because the storms are coincident with periods of low stream competence, the severity of impact is amplified (G. Mendel, WDFW, personal communication, February 2001).

In order to mitigate and restore channel conditions, managers must accurately identify potential and active sediment production areas, at a basin-wide level. Upon their location, managers need to take appropriate actions to address mitigation and restoration. Efforts should address both upland and lowland landscapes in order to identify source and delivery areas. Problem areas may be addressed by implementing BMPs as documented in the TMDL water quality management plans (Oregon Department of Environmental Quality et al. 2000; Washington Department of Ecology 1999). Initiation of a TMDL study in the Washington portion of the subbasin is warranted.

Protect Stronghold Habitats

Particular areas of the basin provide habitat and species strongholds. These areas are considered of highest quality habitat and paramount to the continuance of water quality and many species, particularly summer steelhead and bull trout. These areas are the life-blood of the basin and account for the majority of fish production. Should catastrophic events occur, these areas would likely be instrumental in maintaining a basin-wide population base. In Oregon, the upper North and South Forks of the Walla Walla River, and Mill Creek within the Mill Creek Watershed. On the Washington side, stronghold areas include the Wolf Fork above Robinson Creek and the North Fork of the Touchet above its confluence with the Wolf Fork (Glen Mendel, WDFW, personal communication). Current management and/or protective strategies that have allowed stronghold habitats to persist must be continued. Enforcement of state and federal laws needs to be increased for fish protection, habitat protection, and water quality/quantity protection. Above all else, stronghold habitats should be protected to maintain their current status. Habitat acquisition should be emphasized where opportunities exist to protect stronghold fish and wildlife habitats or to enhance areas to stronghold status.

Increase Adult Spawners

Endemic salmonid species currently documented to be limited by adult spawners in the Walla Walla subbasin are bull trout (Hanson et al. 2001) and summer steelhead. Recently reintroduced spring chinook are also limited by lack of adult spawners. Natural production of steelhead in both Oregon and Washington portions of the basin are at about 300 to 400 fish annually (Table 17 and Table 18). Historic populations were estimated to be about 4,000 to 5,000 (Chapman 1981). The multitude of human-caused impacts to Walla Walla steelhead populations through the years have not, on average, allowed natural production to replace itself. This is not unusual as most endemic salmon and steelhead populations in the mid- to upper-Columbia River system are experiencing similar trends. Even if replacement was occurring, current populations are not at levels that can meet natural production and harvest numeric objectives. Spring chinook, in initial stages of reintroduction (adult outplanting experiments), are not capable of meeting seeding levels. As a result, key needs for the Walla Walla steelhead and spring chinook restoration program is habitat enhancement (in and outside basin) and artificial production efforts to generate more adult spawners from which to build.

There are numerous strategies for increasing adult abundance of salmonid fish populations including improvements in total survival, reduction of sport and/or commercial harvest, artificial propagation and habitat and passage improvement. Current efforts to increase bull trout adult abundance are to prohibit sport harvest, improve habitat and passage and to improve survival of fish with a fluvial life history. These efforts should be continued and improvements made through monitoring and evaluation of the fluvial life history pattern. Steelhead abundance below objectives should be addressed through habitat improvement and hatchery supplementation with endemic Walla Walla stock (CTUIR). Spring chinook abundance below objectives should be addressed through habitat improvement and continued hatchery supplementation (adult outplanting) with the additional production proposed by CTUIR. Monitoring of adult return success and survival (for anadromous species) should be continued.

Increase Smolt to Adult Returns

Low smolt-to-adult returns (SARs) impede efforts to achieve natural production, broodstock, and harvest objectives in the Walla Walla subbasin due to both in and outside subbasin issues.

Inside subbasin issues relate to improved passage conditions (in-river flows, water quality, and management of smolt by-pass facilities) that will result in higher smolt survival. The Walla Walla River Fish Passage Operations Project should continue to oversee operation of fish by-pass facilities and monitor river conditions to optimize in-river conditions for smolt outmigration. Fish managers should support development and implementation of actions to achieve waste load allocation similar to that adopted by the Umatilla TMDL (Oregon Department of Environmental Quality et al. 2000) to improve water quality conditions for salmonids.

Outside subbasin issues relate to reducing the mortality of downstream migrants through the impounded Columbia River mainstem to meet production and harvest objectives. Specific emphasis is needed to address human-induced changes regarding fish passage, water quality, predation, and estuary conditions. These specifics are expected to be identified in mainstem subbasins as a part of the NWPPC's fish and wildlife restoration planning and implementation process. Without appropriate sharing of the conservation burden throughout the fish's life history, concentrated efforts in the subbasins will have limited results.

Address Research/Data Gaps

Natural Production

- Document primary and secondary steelhead spawning areas.
- Determine key migration routes, run timing and winter holding areas of fluvial bull trout.
- Evaluate juvenile salmonid outmigrant timing and survival. Identify and document problem reaches and factors.

- Evaluate success of out-planting spring chinook adult into spawning and rearing areas, monitor resulting progeny at the parr, smolt and adult life-history stages.
- Collect trend data for salmonid distribution, abundance, densities, and aging growth throughout the subbasin.
- Maintain archive of genetic material for steelhead and bull trout.
- Assess the effect of exotic fish species on resident and migratory salmonids.
- Increase monitoring and assessment of indigenous steelhead, bull trout, mountain whitefish and other species to determine abundance and population status:
  - Determine steelhead abundance in Mill Creek and bull trout run timing.
  - Increase bull trout monitoring to determine population abundance and distribution in the Touchet River system.
  - Increase spawner surveys to detect movements and reproductive isolation and distribution.
- Refine or determine appropriate adult steelhead and bull trout abundance for spawner escapement goals.

Artificial Production

- Assess the level of residualism from hatchery-reared steelhead from the subbasin.
- Assess the in-basin level of straying and spawning into natural steelhead production areas by non-endemic hatchery steelhead.
- Reconstruct/improve Touchet River trap in Dayton.
- Evaluate straying of reintroduced Walla Walla spring chinook into the Tucannon River.

Flows/Passage

- Determine passage success of adult steelhead and bull trout past irrigation diversions and other passage obstacles.
- Evaluate results of existing flow enhancement efforts and define most feasible options to meet additional needs.

Habitat

- Basin-wide inventory of all surface water diversions.
- Inventory salmonid habitat in the Oregon portion of the subbasin.
- Increase water quality monitoring within the subbasin.

Planning

- Develop a research/restoration plan for Pacific lamprey.
- Develop a research/restoration plan for shellfish.

Wildlife

Needs

Habitat

Grassland and Shrubsteppe

- Protect, maintain, and enhance shrubsteppe habitats.
- Improve connectivity between existing shrubsteppe fragments.
- Move savannah grassland with potential brooding, leking and wintering sharp-tailed grouse habitat into protect status.
- Enhance and restore native perennial grassland habitats.
- Reduce non-native annual grasses in shrubsteppe and grassland habitat.
- Pursue and implement effective biological controls on noxious weeds including yellow-star thistle and knapweeds.

Forest

- Protect, maintain, and enhance late-seral dry forest habitats.
- Maintain large patch size late-seral dry forest stands.
- Restore and maintain snag and downed wood densities of a variety of species to meet nesting and foraging requirements of forest dwelling landbirds.
- Move mid-elevation and foothill big game winter range habitat into protected status
- Protect, enhance, and restore aspen clones.
- Reduce road densities and associated impacts to watershed functions.

Riparian

- Control noxious weeds in specific high value habitat areas (i.e. reed canary grass in wetland and riparian communities).
- Restore riparian understory shrub communities.
- Maintain and improve large structure riparian cottonwood galleries for Lewis' woodpecker.
- Identify and protect remaining ferruginous hawk nest sites and associated habitats in the subbasin.

Wildlife Populations

- Restore anadromous fish populations to support dependent wildlife populations and promote natural nutrient cycling.
- Evaluate status of avian species that are inadequately surveyed by standardized survey protocols.
- Evaluate the importance of individual habitat fragments to native wildlife species on private lands in the subbasin.
- Assess methods to reduce cowbird parasitism on native bird species.
- Inventory herptile and small mammals and their habitats in the subbasin.
- Maintain, protect, and enhance big game winter range.
- Reduce bullfrog predation on juvenile western painted turtle and other native herptiles.

- Reduce domestic sheep/bighorn sheep conflicts in primary Rocky Mountain bighorn sheep habitat.
- Reintroduce Rocky Mountain bighorn sheep into suitable habitats.
- Reestablish harvestable populations of mountain quail.
- Assess impacts of ravens, cowbirds, crows, starlings, and magpies on species at risk.
- Assess the impacts of shed antler collecting on deer and elk herds and associated habitats.

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Subbasin Recommendations

FY 2001 Projects Proposals Review

The following subbasin proposals were reviewed by the Walla Walla River Subbasin Team and the Province Budget Work Group and are recommended for Bonneville Power Administration project funding for the next three years.

Table 1 provides a summary of how each project relates to resource needs, management goals, objectives, and strategies, and other activities in the subbasin.

Projects and Budgets

Continuation of Ongoing Projects

Project: 199601100 – Walla Walla River Juvenile and Adult Passage Improvements

Sponsor: CTUIR

Short Description:

Provide safe passage for migrating juvenile and adult salmonids in the Walla Walla Basin by constructing and maintaining passage facilities at irrigation diversion dams and canals.

Abbreviated Abstract:

In the 1990's, CTUIR and ODFW along with many other agencies began implementing fisheries restoration activities in the Walla Walla Basin. An integral part of this effort, as outlined in Section 7.11B of the 1994 Fish and Wildlife Program, is to alleviate the inadequate migration conditions in the basin. Fish populations in the Walla Walla River have been heavily impacted by inadequate passage facilities at diversions and resultant dewatering associated with agricultural demands and are a primary factor in the decline of native summer steelhead runs and extirpation of spring chinook salmon in the basin.

The Passage Improvements Project goal is to assist in the restoration of salmonid populations in the Walla Walla Basin by increasing adult and juvenile migrant survival. The project provides survival benefits for migrating juveniles and adults by removing passage barriers, improving fish ladders and canal screens, and operating and maintaining passage facilities. This project will integrate with other fisheries restoration activities in the basin by addressing passage issues imperative to the continued survival and reintroduction of salmonid fish within the basin. It is expected that by providing safe passage to juvenile and adult salmonid fish, naturally spawning populations of salmonids will be elevated, and juvenile outmigration increased.

Relationship to Other Projects:

Project #	Title/description	Nature of relationship
20139	Walla Walla River	Project 20139 identifies passage improvements to be

	Fish Passage Operations	completed under the proposed project. Project 20139 also provides technical input on facility designs and operational criteria and is involved in operation and maintenace of facilities after completion.
8805302	NEOH Walla Walla Hatchery Facility	After completion of hatchery, proposed project will provide improved passage for adults and juveniles produced from the facility.
9604601	Walla Walla Basin Fish Habitat Enhancement	Proposed project provides improved passage for adults and juveniles to and from natural production areas.
20127	Walla Walla Basin Natural Production M&E	Proposed project provides improved passage for natural adults and juveniles to and from natural production areas.

Relationship to Existing Goals, Objectives and Strategies:

As stated in Section 9.b., inadequate passage conditions for both upstream and downstream migrants were a primary contributor to the extirpation of salmon and decline of steelhead in the Walla Walla Basin. Although many passage improvements have been implemented there are still a number of locations where migrants encounter inadequate migration conditions. The goal and objective of the project is directly related to the goals and objectives stated in the Subbasin Summary by assisting in the restoration of salmonid populations in the Walla Walla River by increasing the tributary survival of migrating adults and juveniles through improved passage conditions.

Strategy 5 (*Restore or enhance fish passage for resident and anadromous upstream and downstream migrants.*) in the Subbasin Summary identifies four actions which are directly related to the project. Action 5.1 is to continue to identify passage and screening needs, Action 5.3 is to implement screening of all diversions, Action 5.4 is for operating and maintaining all fish passage facilities, and Action 5.5 is to ensure adequate passage conditions exist.

The project goal of assisting in the restoration and rebuilding of salmonid populations in the Walla Walla Basin is directly related to the Council's mandate to protect, mitigate, and enhance fish and wildlife affected by development and operation of the hydropower system. Though the project falls under the Columbia Plateau Ecological Province for which specific objectives and strategies will be adopted later, the project does address the Council's Basin-level biological objectives listed in the 2000 Fish and Wildlife Program. More specifically, the project objective of increasing tributary survival directly addresses the three items listed in Section III.C.2.a.1. (*Anadromous fish losses*); halt declining population trends, restore natural populations, and increase adult runs.

The Passage Improvements Project is also directly involved in one of the RPA actions listed in the NMFS 2000 FCRPS Biological Opinion. Although the Walla Walla Basin is not specifically identified in Action 149, the project is involved in activities associated with that Action and listed under Section 9.6.2.1 (*Actions Related to Tributary Habitat*).

Review Comments:
Project addresses NMFS RPA 149.

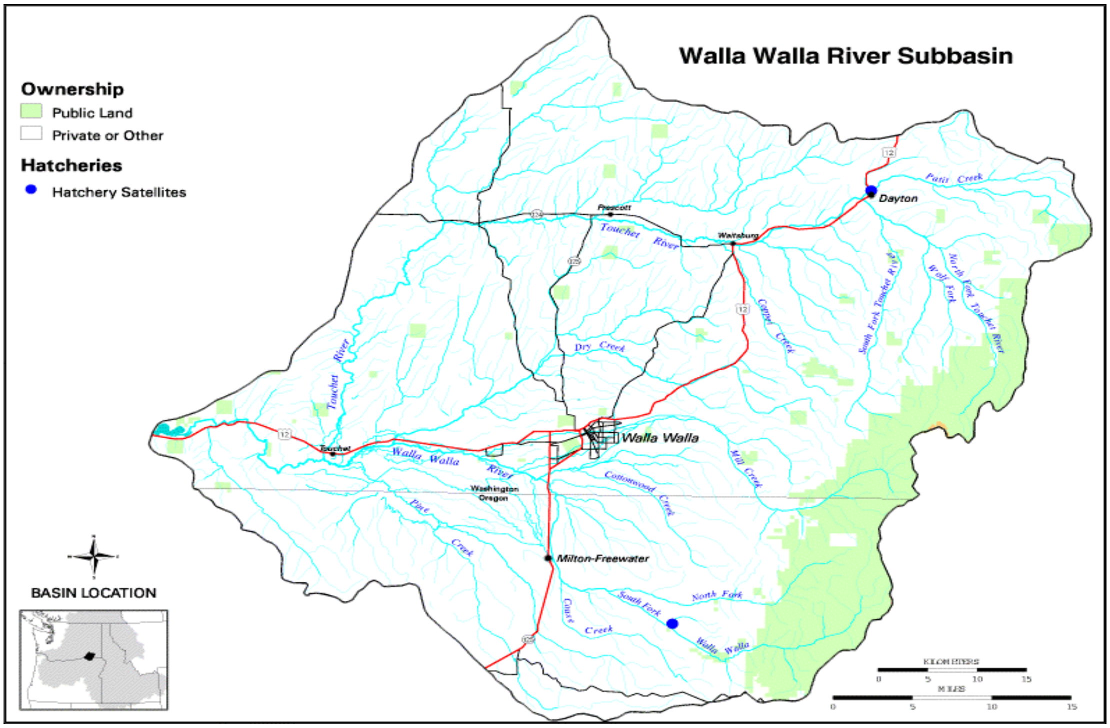
Budget:

FY02	FY03	FY04
2,856,000 Category: High Priority	2,125,000 Category: High Priority	1,375,000 Category: High Priority

Project: 199604601 – Walla Walla Fish Habitat Enhancement

Sponsor: CTUIR
Short Description:
Protect and restore habitat critical to the recovery of weak or reintroduced populations of salmonid fish in the Walla Walla Basin thereby promoting natural ecological function and improved water quality and quantity.

Abbreviated Abstract:
This project is a continued effort by the CTUIR in cooperation with local landowners to address habitat parameters necessary for rebuilding healthy, naturally producing populations of salmonid fish in the Walla Walla Basin. The project objectives are: 1) Identify, select, and implement habitat restoration and protection projects that provide long-term benefit to biological systems and the salmonid fish relying on them; 2) Continually elevate benefit to salmonid species and biological life within project areas through improved methodology. Habitat interventions implemented under this project will function at a watershed level, employ proven scientific methods, and strive to restore and protect biological diversity and natural floodplain and channel function. The project focuses on areas within the basin that are expected to provide the greatest benefit to target species while understanding the considerable monetary investment made by the public and need for cost efficiency.



Project areas are selected by referencing the Walla Walla Basin Watershed Assessment (Draft), the Walla Walla Subbasin Review (CTUIR, et al. , submitted to the Power Planning Council), literature search, public outreach, landowner contact, interagency communication, and on-staff experience. Once a project site has been chosen, field surveys are done to clearly identify factors most limiting salmonid production; restoration efforts are then designed to meet them. All projects begin with long-term (15 years or longer) easements designed to protect the resource, the landowner, and the investment of the CTUIR, Bonneville Power Administration, and others. Considerable effort is always given to identify cost-share opportunities. This project has successfully secured more than 250,000 dollars in cash cost-share during the last 3 years. Natural healing methods are taken whenever possible and recognition is given to the fact that depending on the site, some restoration approaches will be more effective than others. Pre and post project monitoring and evaluation is included for all projects. Monitoring data will be used for improving project strategies through adaptive management and also for education, and interagency exchange.

Relationship to Other Projects:

Project #	Title/description	Nature of relationship
8710001	Umatilla River Basin Habitat Enhancement	To reduce cost, projects share personnel, vehicles, and equipment
9608300	Grande Ronde Subbasin Watershed Restoration	To reduce cost, projects share personnel, vehicles, and equipment

Project #	Title/description	Nature of relationship
20003100	North Fork John Day River Basin Anadromous Fish Habitat Enhancement Project	To reduce cost, projects share personnel, vehicles, and equipment
9601100	Walla Walla Juvenile Fish Screens	Improved fish passage will increase survival to and from natural production areas enhanced under this project.
20138	NEOH Walla Walla Hatchery	Hatchery project will provide increased escapement of spring chinook salmon and summer steelhead to spawn and rear in the habitats enhanced under this project.
20082	Rainwater Wildlife Area	The Rainwater project will work with this project in sharing funds and expertise toward restoration and protection of this valuable area.

Relationship to Existing Goals, Objectives and Strategies:

Consistent with the intent of section III, part 2 of the 2000 FWP, this project is needed to meet one component of recovery efforts in a broad range of strategies. Habitat restoration and protection implemented under this project will compliment ongoing efforts to engage passage improvements, instream flow enhancement, artificial propagation, and production research.

Enhancements proposed under this project over the next three years will be consistent with areas identified in the Walla Walla Subbasin Summary as habitat deficient and as higher priority streams for restoration. The primary objective of the project is to protect and restore habitat critical to the recovery of weak or extinct populations of salmonid fish within the Walla Walla River Basin. In meeting this objective, this project will further the goals set forth in the 1994 FWP by: (1) protecting existing high quality habitat; (2) prioritizing restoration projects through the use of watershed assessment; (3) giving priority to restoration actions that maximize the desired result per dollar spent; (4) implementing proven habitat restoration methods, particularly natural healing techniques; (5) seeking cost-share (250k has been secured in last 3 years) and encouraging the investment of volunteers; (6) coordinating data collection, analysis and reporting, and adaptive management to monitor project progress; (7)implementing riparian easements of sufficient quality to improve and maintain salmon and steelhead production in privately owned riparian areas and adjacent lands.

Considerable time has been spent insuring that the goals of this project closely reflect biological needs of salmonid fish outlined in the Subbassin Summary. The following table outlines some of these relationships.

Table 1. Goals found in the Subbasin Summary and actions/strategies that this project will impose to meet them.

Subbasin Summary Goals	**Project Actions/Strategies for meeting Goals**
Improve Stream flows/Temperatures	Reestablish vegetation (livestock exclusion, planting), stream meander, and floodplain thus elevating hyporheic flow and bank storage.
Address Passage Impediments	Strategy will vary depending on site. Project will cost-share on removal of a complete barrier and modification of several push-up dams in 2001 and 2002.
Improve Riparian Habitats	Long-term lease, wide stream buffers, livestock exclusion, native revegetation, off-channel watering, bioengineering, weed control, acquisition, and encouragement of farm programs.
Increase Instream Diversity	Revegetation, reestablished channel meander and stable channel form, placement of LWD where appropriate, floodplain and riparian function.
Reduce Sediment Input	Reestablish biological filter and reduce stream velocities (scour) with vegetation, functioning floodplain, stream meander enhancement, wide buffers, livestock exclusion, encourage upland BMP's.
Protect Stronghold Habitats	Acquisition, insure protection through, enforcement and proper zoning, long-term lease.
Increase Adult Spawners	Elevate juvenile survival through revegetation, channel meander and stable channel form, instream complexity, livestock exclusion, stream buffers, floodplain function, bioengineering, etc.

Although the CTUIR will continue to implement individual projects with cooperative landowners, efforts are currently underway in all targeted watersheds to tie existing and proposed enhancements together. Such an expanded approach will result in stream reach-level habitat recovery and complement other Bonneville Power Administration funded projects in achieving more comprehensive watershed restoration goals.

Short-term project effects shall include native plant community recovery, increased stream bank stability and increased stream channel shading. Long-term project effects shall include improved stream geomorphic features, vegetative succession, cooler stream temperatures, reduced sediment deposition, increased large woody debris recruitment, greater habitat diversity, increased juvenile and adult salmonid freshwater survival, greater salmonid offspring out-migration and increased bird, mammal and invertebrate populations.

Blue Creek Project Area Photos

May 1998	July 1999
	

Review Comments:
No review comments.

Budget:

FY02	FY03	FY04
287,407 Category: High Priority		

Project: 199802000 – Assess Fish Habitat and Salmonids in the Walla Walla Watershed in Washington

Sponsor: WDFW
Short Description:
This project includes design and construction of adult traps in Mill Creek and the Touchet River, and steelhead and bull trout monitoring activities in those drainages and in the lower Walla Walla River. It also includes participation in NEOH planning.

Abbreviated Abstract:
The intent of this project has been to collect baseline field data concerning fish habitat conditions and salmonid distribution and abundance information that are needed to guide numerous state and federal watershed and fish protection or restoration planning efforts. We have obtained detailed stream flow and water temperature data from many of the streams in the basin within Washington state. We have also conducted spawning ground surveys and summer electrofishing or snorkeling surveys in most Washington streams to determine indigenous salmonid (steelhead/rainbow, bull trout, whitefish) distribution and relative abundance. Further, the surveys have provided some information about the distribution of native non-salmonids and introduced species within the basin. Our surveys have incidentally located several previously unknown or undocumented barriers to fish

migration. In some cases these barriers have precluded salmonids from spawning and rearing in nearly entire streams.

We propose modifying this project to focus our monitoring and evaluation on specific areas and expanding the project in FY2002 to also assess adult steelhead and bull trout populations in two major Washington tributaries to the Walla Walla River: Touchet River and Mill Creek. The assessment will require construction at two existing facilities in the basin, and will include trapping, tagging and monitoring of spawning for both species in both rivers. Juvenile sampling and tagging will also be expanded in 2002 to fully describe the productive nature of the rivers and life history patterns and survivals within the basins. Electrofishing and snorkeling will be used to capture juvenile fish during summer, and a rotary migrant trap on Touchet River will be employed to estimate smolt outmigration. Smolt trapping may be initiated in Mill Creek in 2003 if an ODFW study is not funded in 2002. PIT tags and CWT tags will be used to help estimate parent-to-progeny survival rates, and identify life stage(s) within the populations that may be experiencing higher than expected mortality, possiblyassociated with habitat problems.

Relationship to Other Projects:

Project #	**Title/description**	**Nature of relationship**
199604601	Walla Walla River Basin fish Habitat Enhancement - CTUIR	The WDFW proposed project provides drainage-wide estimates of adult steelhead returns for Mill Creek and Touchet R. and other fish information that may help guide the CTUIR habitat project and assist in evaluating its success.
199601100	Walla Walla Passage Projects - juvenile screens and trapping	The WDFW proposed project supplements juvenile trapping on the Walla Walla River with trapping in the Touchet River and potentially Mill Creek in the future. It also provides flow and fish data that can be used to guide the CTUIR project.
199601200	Walla Walla Passage Projects - anadromous fish passage	The WDFW proposed project supplements the adult passage project by CTUIR by coordinating with the COE to improve the ladder at Bennington Diversion dam and install a trap.
200003800	Walla Walla Hatchery Master Planning	The WDFW proposed project would ensure that WDFW would be fully engaged in this process as a co-manager in the basin.
200002600	Rainwater Wildlife Area Operations and Maintenance	The WDFW proposed project would provide useful information for management and evaluation of the Rainwater Project and the returns to the Touchet Basin.
200003800	Walla Walla River passage operations	The WDFW proposed project supplements the CTUIR project by monitoring the fish ladder at Mill Creek and supplying adult passage and flow data in Mill Creek and the Touchet River while CTUIR monitors passage and adult counts in the Walla Walla River.

Project #	Title/description	Nature of relationship
200003900	Walla Walla Basin Natural Production Monitoring and Evaluation	The WDFW proposed project would supplement the CTUIR project and provide adult trap data from Mill Cr. and the Touchet R. and other information that CTUIR has not identified as activities or locations in their proposal.
	FCRPS - RPA 9.6.2.1 Action 151	Efforts to improve tributary habitat quality and quantity have been identified as critical for recovery of salmon. This proposed project would continue to assess the effect of increased water flows being made available in the basin.
	FCRPS - RPA 9.6.4.2	Development of local brood steelhead and supplementation of populations through NEOH and LSRCP have been proposed. Data provided by this proposal will help guide managers to best decisions for wild populations.
	FCRPS - RPA 9.6.4.3	Data already collected indicate some steelhead populations in the basin may be severely depressed. Further study is needed to determine whether safety net actions provided by Artificial propagation are necessary to prevent extirpation.
	FCRPS - RPA 9.6.5	This project is consistent with monitoring and evaluation of population status and the environmental status of sub-basin. This is especially important where populations may approach self sustaining levels.
	LSRCP Mitigation Program	Data collected from this project would complement LSRCP collected data, and aid in decisions affecting hatchery production and releases, and stocks used for production/recovery.

Relationship to Existing Goals, Objectives and Strategies:

Existing resource planning efforts for the Walla Walla basin provide new information and complement one another, but they all tend to use much of the same limited data for fish habitat conditions and salmonid distribution and abundance. For example, it is common knowledge that portions of the Walla Walla and Touchet rivers are dry or very warm in spring and summer because of irrigation withdrawals and other factors. These low flows and high stream temperatures likely affect salmonid passage, use, or survival in the lower rivers, but the extent and duration of these problems have only recently been partly quantified by this project. Also, current information on salmonid distribution, habitat use, abundance and stock identification has been limited or incomplete. Additional field data are necessary to adequately plan for habitat and salmonid stock restoration or protection. Our on-going project, funded by BPA, has provided field measurements of water availability and temperatures, as well as some data on salmonid rearing and spawning distribution and abundance. Now that we have much of the broad-based data in hand, our current proposal would continue some baseline monitoring and refine our focus to collect data to address more specific concerns about naturally produced steelhead stock status in the Touchet River and Mill Creek and the effects of water flow enhancement in previously dewatered stream reaches. These data are key elements necessary for watershed and fish stock restoration planning and implementation within the basin.

The Walla Walla basin may represent a unique opportunity to implement portions of the NWPPC Fish and Wildlife Plan (FWP). Significant portions of the upper basin in both Oregon and Washington retain spawning populations of wild steelhead. These populations have shown a resiliency to habitat degradation and a persistence of viable numbers during recent years when other steelhead populations have been forced toward extinction. Because the basin lies above only the four lower Columbia River dams, these steelhead may be able to persist under moderate survival conditions and possibly rebuild themselves under good habitat conditions. The 1995 FWP identifies the need to 'halt (the) decline and rebuild populations to sustainability' (Sect. 4.1), and promote the funding of projects directed at critical unknowns or uncertainties (3.2 C, 4.1 A, 4.2 A). Two critical uncertainties exist within the basin: 1) are populations of steelhead within Washington's portion of the Walla Walla above, or at, replacement, and if not; 2) how best can managers intervene to rebuild steelhead populations that appear to be on the edge of successful productivity in the Walla Walla River Watershed. A full understanding of Walla Walla River steelhead life history and their productive capacity is needed to ensure that actions which are proposed, whether watershed type habitat improvements (4.1 A), hatchery supplementation (7.0 A, 7.3), or both, are correctly directed to achieve maximum benefit for the fish (4.1).

The existence of Lower Snake River Compensation Program (LSRCP) hatchery mitigation within the basin raises further questions: should mitigation releases of hatchery steelhead continue, should new broodstocks be developed for the program to reduce the potential for negative impacts of hatchery production and serve as a more appropriate source of supplementation fish, and can wild populations within the basin be used for broodstock development without serious damage. Answers to these questions must be obtained and integrated into existing management documents if managers are to make informed decisions that benefit natural populations. More data is needed to most effectively meet requirements outlined in the FWP, by the ESA, Washington's Wild Salmonid Policy (1997), and in the Walla Walla River Basin Master Plan (1993). Funding of this proposal under the FWP seems a logical extension of work already begun within the basin. WDFW in currently not fiscally able to augment their presence in the basin and expanded monitoring and evaluation will be crucial in documenting recovery efforts. Partnerships between co-managers and the potential for future matching funds from Washington State as part of their salmon recovery effort will be advanced if this steelhead monitoring and evaluation work is funded and allowed to continue.

The initial work within the Washington portion of the basin has been accomplished as part of the evaluation activities associated with the LSRCP mitigation program. Currently the LSRCP program releases about 250,000 hatchery smolts into the Walla Walla basin annually. The LSRCP program is committed to responding to the needs of ESA listed populations that may be currently, or have been, affected by hatchery smolt releases and to improve hatchery production practices for the benefit of wild populations (FWP 7.2). A greater understanding of basin wide population dynamics will guide actions which can be taken as part of the LSRCP, such as developing a locally adapted broodstock(s), altering hatchery smolt release strategies to minimize temporal and spatial overlap of wild and hatchery adult fish, or the direct supplementation of weak naturally spawning populations. Further more invasive actions as described in recent NMFS Biological Opinion and RPAs (safety net actions to prevent extinction of important within-ESU populations) could also be considered if necessary. The increased fish resource knowledge within the basin may provide insight in to factors which may limit the success of future attempts to re-introduce spring chinook salmon (Walla Walla River Subbasin Plan).

The Walla Walla Subbasin Plan, written over ten years ago (CTUIR 1989), and the draft Walla Walla Master Plan (CTUIR 1993) which was based on the Subbasin Plan, recommend using hatcheries for supplementing steelhead and reintroducing spring chinook salmon in the Walla Walla watershed. The Northwest Power Planning Council FWP (NWPPC 1995) calls for regular updating of subbasin plans (7.0C) and collection of population status, life history and other data on naturally spawning (wild) populations (7.1C and 7.1C.3), which includes bull trout (10.5A). It also calls for improved hatchery production, or developing new hatchery supplementation programs, while proceeding with extreme caution to avoid damaging remaining naturally spawning populations (7.2). The FWP recommends developing, implementing and evaluating supplementation plans and risk assessments (7.3, 7.3B.1, 7.4A). It also requires writing a hatchery production Master Plan (7.4B, 7.4L) that includes identification of factors limiting production and setting project goals and objectives. A watershed assessment and coordination of habitat planning efforts is recommended (7.6C). The FWP also states that instream flow needs should be established and protected (7.8G). The Independent Scientific Review Panel (ISRP 1997) recommended that watershed assessments precede implementation of restoration projects (III.B.11). The NWPPC in its Annual Implementation Work Plan for Fiscal Year 1998 (NWPPC 1997) concurred with the ISRP's recommendation that watershed assessments that describe habitat conditions, as well as needs and opportunities for habitat restoration for fish stocks inventoried in that watershed, precede implementation of restoration activities.

Many aquatic habitat enhancement projects have been implemented with state or federal funds in the basin in the past 3-6 years. Some examples follow (see pg 101 and 124 of the subbasin summary for more detail). The NWPPC has approved and funded several habitat enhancement projects with the CTUIR, and the Walla Walla Conservation District. Additional aquatic resource enhancement and data collection efforts are underway in the basin by the US Army Corps of Engineers (COE) for resource planning and environmental restoration (COE 1992, COE 1997) and by a citizen watershed council in Oregon (BOR 1997). The Columbia County Conservation District has used state funding for Instream flow and water quality studies in the Touchet River. There is a current effort to develop a bi-state agreement to conserve and protect instream water and develop a Habitat Conservation Plan (HCP) between local governments and citizens and the USFWS and NMFS. A Subbasin Plan (CTUIR 1989) and a draft hatchery production Master Plan (CTUIR 1993) have also been compiled for the watershed, but these plans are outdated. A Hatchery and Genetics Management Plan (HGMP) for the Touchet is under development for the LSRCP program's development of a local Touchet steelhead broodstock. The U.S. Forest Service (USFS) and the ODFW are conducting bull trout spawning surveys and a radio telemetry study in Mill Creek and the ODFW, CTUIR, Irrigation Districts, WDFW and the Walla Walla Watershed Council are beginning additional bull trout radio telemetry studies in the basin. The BPA and Washington's Salmon Recovery Funding Board (SRFB) have funded water intake screening efforts throughout the basin. All these efforts in the Walla Walla watershed are for planning or implementing watershed and fish stock restoration programs, collecting additional habitat or fish information, or for providing and protecting instream flows and wild salmonids.

The WDFW is proposing to continue an on-going watershed habitat and salmonid fish stock assessment in that portion of the Walla Walla Basin within Washington State. The project would continue to assess the habitat conditions (particularly stream flows and water temperatures) that affect steelhead and bull trout use and passage in the lower portion of the basin, as well as the potential for adult and juvenile passage of spring chinook salmon, which have been recently reintroduced through an experimental reintroduction project undertaken by CTUIR within the N.F. Walla Walla River and Mill Creek. Habitat and fish stock assessment in the middle and upper watershed within Washington would evaluate the amount of potential rearing and spawning habitat available for salmon, and habitat conditions and habitat limiting factors, habitat use, distribution, densities, abundance and genetic stock characterization of existing natural populations of steelhead and bull trout.

The objectives and tasks detailed in this proposal are well supported in the subbasin fish and wildlife needs section and exising goals, objectives and strategies section of the recently submitted Walla Walla Subbasin Summary. The proposed project objectives and tasks related to evaluation of the status of steelhead stocks in the Touchet River and Mill Creek (objectives 1, 3, 4, 5, 6) are supported by several existing goals, objectives, strategies and actions in the subbasin summary. Continued baseline genetic monitoring is supported by goal 4, Action 11.1 (pg 111 and 116) and in the fish and wildlife needs section to monitor and evaluate natural production (pg 133) in the subbasin summary. The evaluation of steelhead stocks is included in Goal 1 (pg 111) of the subbasin summary to protect, enhance and restore wild populations of steelhead. That includes modifying or constructing and operating the Touchet River and Mill Creek traps (Actions 12.1 and 12.2, pg 117, and fish and wildlife needs, pg 133) to monitor adult steelhead and other species. The Touchet River trap is inefficient and needs to be improved to monitor the returns of adult hatchery and wild steelhead and for development of a local steelhead broodstock for the LSRCP hatchery program that minimizes its potential effects on ESA listed wild steelhead (Actions 8.4 and 9.3, pg 116). Monitoring of adult steelhead returns and survival is also included in the subbasin needs section under natural production (pg 132) to increase monitoring and evaluations of adult steelhead and indigenous salmonids, to refine spawner escapement goals (pg133), and in Actions12.3 and 15.3 to conduct redd surveys and determine out-of-basin survival and timing and smolt-to-adult and adult-to-adult survivals. Monitoring and evaluating juvenile steelhead distribution, abundance, life history, migration timing and smolt production is included in the subbasin summary as Actions 12.4 and 12.5 (pg117) and in the fish and wildlife needs section (pg 133).

Our proposed objectives (objectives 5 and 7) to continue to monitor stream flows, water temperatures, salmonid distribution and abundance in rewatered stream reaches and other portions of the mainstem Walla Walla River and its nearby tributaries is supported by

Actions 4.1, 4.3, 4.8 4.9 (pg 114) and action 12.7 (pg 117) to evaluate and refine our understanding of stream dewatering and results of flow enhancement efforts (fish and wildlife needs pg 133).

Our proposed objective (#2) to evaluate bull trout and spring chinook use of the Touchet and Mill Creek watersheds is included in many of the actions under strategy 12 (pg 117) that apply to indigenous fish, Action 9.1 to monitor and evaluate reintroduced spring chinook salmon under fish and wildlife needs for the basin (pg 132 – increase adult spawners second paragraph) to monitor and evaluate the fluvial life history pattern of bull trout and under natural production research/data gaps (pg 133).

Our effort (objective 9), as co-managers, to be more involved in the proposed Northeast Oregon Hatchery Program (NEOH) and Master Planning for the Walla Walla Basin is listed in the subbasin summary in strategy 6 to reintroduce spring chinook and complete the Hatchery Master Plan for NEOH, strategy 7 for steelhead supplementation in the basin (pg 115) and fish and wildlife needs under increase spawners (pg 132).

The Washington Department of Fish and Wildlife (WDFW) has been actively involved for many years with fish habitat and salmonid stock assessment activities in the nearby Tucannon River and Asotin Creek as part of model watershed programs (Asotin Conservation District 1994, Columbia Conservation District 1997), LSRCP hatchery monitoring and evaluation, and stream flow studies of the Tucannon River. The other resource managers in the basin are aware of WDFW's assessment actions in the basin in the past 3-4 years and our proposal to increase knowledge about the status of steelhead stocks in the Touchet River and Mill Creek (submitted a proposal to the NWPPC/BPA in 1999). The resource entities have indicated support for our proposal. The proposed WDFW project would supplement efforts by all other organizations by providing detailed, quantifiable salmonid habitat and population data for much of the basin in Washington that are necessary for adequate resource planning and restoration efforts within the Walla Walla Basin. The WDFW has the expertise for the proposed data collection and summarization for fish habitat and fish stocks in the basin. Genetic stock identification and characterization will be obtained from portions of the Walla Walla Basin in Oregon and Washington to supplement current WDFW efforts (Busack and Shaklee 1995) to identify salmonid stocks for local and State management, as well as for more regional ESA considerations (Spruell and Allendorf 1997). Genetics samples, data and analyses (Dr. Shaklee as lead) would be available to ODFW, CTUIR, the National Marine Fisheries Service (NMFS), the U. S. Fish and Wildlife Service (FWS), the USFS and other interested parties. Stream discharge, temperature and water quality data proposed to be collected for the Walla Walla and Touchet rivers and tributaries would be of substantial importance to several other resource planning efforts and organizations (eg. DOE, COE, CTUIR, ODFW, Walla Walla Watershed Council in Oregon, the Conservation Districts, etc.). John Covert (WDOE) has much experience with stream flow monitoring. Similar flow studies were conducted in the Tucannon River in the past three years (Covert et al. 1994). The proposed temperature monitoring and habitat and fish stock assessment are similar to activities conducted by WDFW in the Tucannon River (Schuck et al. 1996, Mendel et al. 1993). Mark Schuck and Glen Mendel (WDFW) have been actively involved in salmonid and habitat assessment and monitoring projects in southeast Washington as part of the

LSRCP for many years, and Glen is currently also involved in fish management and fishery coordination for this area.

Review Comments:
No review comments.

Budget:

FY02	**FY03**	**FY04**
362,652 Category: High Priority	249,000 Category: High Priority	252,000 Category: High Priority

Project: 200002600 – Rainwater Wildlife Area

Sponsor: CTUIR
Short Description:
Protect, enhance, and mitigate wildlife habitat impacted by McNary and John Day hydroelectric projects. Project includes O&M to protect existing habitat values, enhancements to increase habitat quantity and quality, and M&E to assess project benefits.

Abbreviated Abstract:
The 8,678 acre Rainwater Wildlife Area was established in September 1998 by the CTUIR under the NPPC Fish and Wildlife Program and Washington Interim Wildlife Mitigation Agreement (BPA et al., 1993) to protect, enhance, and mitigate wildlife impacted by development of the John Day and McNary hydroelectric dams. The project is located in the upper South Fork Touchet River drainage in the Walla Walla River subbasin approximately 8 miles south of Dayton, Washington adjacent to the Umatilla National Forest. The area was selected by the CTUIR and BPA as a regional mitigation project because of its relatively large size, location in the upper headwaters of the Touchet River watershed, and ability to provide dual benefits for fish and wildlife resources and provide in-kind wildlife mitigation.

The project contains 5,000 acres coniferous forest, 2,900 acre grassland, and 800 of acres riparian habitat. Over 10 miles of headwater spawning and rearing habitat exists for Threatened summer steelhead and bull trout, and redband trout. The project provides an estimated 4,337 Habitat Units (HU's) of protection credit and 2,783 enhancement HU's for nine target mitigation species, including: yellow warbler, great blue heron, mink, spotted sandpiper, black-capped chickadee, downy woodpecker, western meadowlark, blue grouse, and mule deer.

Project objectives include 1) continue operations and maintenance to protect baseline HU's; 2) plan, design, and implement enhancements to achieve biological objectives and desired future conditions; and 3) conduct monitoring and evaluation to assess project effectiveness. Operations and maintenance objectives will be achieved by 1) resting rangelands, 2) boundary fence maintenance, 3) noxious weed control, and 4) access and travel management. Enhancement objectives will be achieved by 1) tree and shrub planting; 2) forest thinning; 3) slash pile burning; 4) snag creation; 5) road decommissioning; 6) weed control, prescribed underburning, seeding/rangeland drilling; and 7) instream and floodplain restoration (large woody debris additions, channel realignment, drawbottom road obliteration).

Relationship to Other Projects:

Project #	Title/description	Nature of relationship
21127	Walla Walla Basin Natural Production Monitoring and Evaluation	Project conducts monitoring and evaluation on aquatic habitat and fish population within project area.
960401	Walla Walla Basin Fish Habitat Enhancement Project	Project assists with planning, design, and implementation of fish habitat/watershed enhancement and restoration activities. Project will help cost-share implementation actions related to aquatic habitat.
901100	Assess Fish Habitat and Salmonids in Washington (WDFW)	Project assists in monitoring and evaluation of salmonids within project (primarily steelhead redd surveys). Data coordinated betweeen agencies.

Relationship to Existing Goals, Objectives and Strategies:

The Rainwater Wildlife Area addresses several goals, objectives, and strategies presented in the Draft Walla Walla Subbasin Summary. The following illustrates how the Rainwater project relates to and/or contributes toward the goals and objectives identified in the Subbasin Summary:

Fish and Fish Habitat

Goal - Protect, enhance and restore wild and natural populations of summer steelhead, bull trout, shellfish and other indigenous fish in the Walla Walla subbasin.

Strategy 1, Action 1.1; Strategy 2, Actions 2.1, 2.5, 2.8, and 2.9; Strategy 3, Actions 3.2-3.11; Strategy 12, Actions 12.3, 12.4, and 12.7; Strategy 14, Actions 14.1.

Rainwater contributes toward the Subbasin goal of protecting, enhancing and restoring indigenous Walla Walla Subbasin fishery resources by providing perpetual protection of over 10 miles of fish bearing streams in the upper headwaters of the Touchet River basin. The project will also contribute to the goal and specific objectives by implementing the strategies and actions listed above through planned habitat enhancement and restoration including upland restoration (tree planting, road obliteration and drainage improvement) and instream/floodplain restoration (large woody debris additions, drawbottom road obliteration, development of mature riparian vegetation, and restoration of floodplain function and geomorphic processes. Key habitat parameters addressed by the project are listed in Table 2 under Fish Habitat/Watershed Limiting Factors.

Wildlife Habitat

Goals 1-9 - The key driver for the Rainwater Project is Goal 1 presented in the Subbasin Summary (e.g, to mitigate wildlife habitat losses caused by hydroelectric power development in the Columbia River Basin). The project will contribute over 7,000 HU's towards regional mitigation goals.

Objectives

Objective – Grasslands: enhance and restore native perennial grassland habitats, reduce non-native annual grasses, control noxious weeds.

Rainwater contains 2,900 acres of grassland and shrub cover types. Planned management activities focus on reducing noxious weeds and competing and unwanted vegetation and facilitating development of native/native-like grasslands. Primary grass and shrublands within the project area include Idaho Fescue-Bluebunch wheatgrass (Festuca idahoensis-Agropyron spicatum, FEID-AGSP), Bluebunch wheatgrass-Sandberg's bluegrass (Agropyron spicatum-Poa sandbergii, AGSP-POSA3), and Common snowberry-rosehip (Symphoricarpos albus-Rosa gymnocarpa, SYAL-ROSA). Key wildlife species include western meadowlark, blue grouse, and big game (elk and deer critical winter range).

Objective – Forest: protection, maintain, and enhance late-seral dry forest habitats, maintain large patch size late-seral dry forest stands, restore and maintain snag and log habitat, protect big game winter range, protect/enhance aspen clones, reduce road densities;

Rainwater contains about 5,000 acres of upland coniferous forestland, much of which is currently in an early to mid seral condition due to past logging. Over the next 50 year period, the desired condition is to increase the proportion of late-seral communities and provide old growth habitat. The wildlife area can also provide large patch size, interior forest habitat on Robinette Mountain, which contains approximately 2,500 acres of interior forest habitat. Snag and log habitat will be enhanced and managed to provide optimum habitat conditions for snag and log dependent species. A combination of protection and passive restoration (e..g, allowing natural successional development), coupled with forest management activities including snag creation through fungal inoculations and thinning to promote tree growth will help accelerate development of optimum habitat conditons.

Objective – Riparian: control noxious weeds, restore riparian understory shrub communities, maintain large structure riparian cottonwood galleries.

Over 800 acres of riparian/floodplain habitat exists on the project area. A combination of drawbottom road obliteration, weed control, instream/channel restoration, large woody debris additions, and planting hydrophytic and upland trees shrubs will facilitate development of optimum habitat conditions. Key wildlife species include yellow warbler, spotted sandpiper, mink, great blue heron, summer steelhead, bull and trout.

The project also contributes to the 1994 Fish and Wildlife Program goals and objectives of achieving and *sustaining levels of habitat and species productivity* as a means of fully mitigating wildlife losses caused by construction and operation of the federal and non-federal hydroelectric system (11.1). More specifically, the project area addresses the following goals and principles listed in FWP Section 11.2D.1, which states, "In developing wildlife mitigation plans and projects, demonstrate to the extent to which the plans/projects comply with the following principles:"

- **Are the least-costly way to achieve the biological objective.**

Perpetual protection of the habitat types (riparian/wetland, native grassland, and coniferous forest) provided by the Rainwater Wildlife Area has been accomplished through fee title acquisition. In a study comparing various mitigation methods (i.e., fee title acquisition and easements), Prose et. al. (1986) concluded that "Fee title land acquisition and subsequent management is generally more cost-effective than easements." Similarly, wildlife agency acquisition specialists have also consistently found fee title acquisition to purchase land for wildlife mitigation is usually more economical in the long-term compared with the purchase of easements (Oregon Trust Agreement Planning Project, BPA et al. 1993).

- **Have measurable objectives, such as the restoration of a given number of habitat units**.

Management objectives for target wildlife mitigation species are based on the U.S. Fish and Wildlife Service Habitat Evaluation Procedures (USFWS, 1980). Measured baseline HU's for the Rainwater Wildlife Area have not been established. Habitat surveys are currently underway to assess baseline conditions. Under the CTUIR-BPA MOA, the CTUIR has identified an estimated baseline 4,337 HU's. An estimated 2,783 HU's can be developed through habitat enhancements for a total project benefit of an estimated 7,120 HU's.

- **Protect high quality native or other habitat or species of special concern, whether at the project site or not, including endangered, threatened, or sensitive species.**

By virtue of its size, the Rainwater project area lends itself to the protection and enhancement of biological diversity and ecological integrity in the Walla Walla River basin. The property contains over 5,500 acres of forested environments which will benefit target wildlife mitigation species dependent on forest environments such as the downy woodpecker, black-capped chickadee, mule deer and blue grouse. An estimated 2,091 acres of native grasslands provide suitable habitat for target species such as western meadowlark. In addition, over 800 acres of riparian/floodplain cover types provide habitat for the yellow warbler, great blue heron, mink, and spotted sandpiper.

The project area provides suitable habitat for several Federal and State Threatened, Endangered, and Sensitive (TES) species including threatened Northern bald eagle, endangered American peregrine falcon, and State sensitive osprey, great blue heron, Lewis' woodpecker, prairie falcon, turkey vulture, northern goshawk, and golden eagle. In addition, the area supports known populations of threatened summer steelhead and bull trout.

- **Where practical, mitigate losses in-place, in-kind.**

The Rainwater Wildlife Area was prioritized and ultimately selected for project developed by the CTUIR because of the location and size of the property and its ability to achieve dual benefits for both fish and wildlife. Although the project area is located offsite, it is within about 42 aerial miles of Lake Wallula on the Columbia River and about 24 aerial miles from the Snake River near the Ice Harbor facility. Of the eleven target wildlife mitigation species for the John Day and McNary projects, the Rainwater Wildlife Area will provide benefits for 8 target wildlife species. The project HEP team will consider incorporation of mule deer and blue grouse as additional evaluation species.

- **Where possible, achieve dual benefits for fish and wildlife**

In terms of the project achieving dual benefits, the property supports spawning populations of bull trout and summer steelhead and has the potential to substantially contribute to Walla Walla River Basin anadromous fish restoration by improving juvenile salmonid survival and rearing. CTUIR Fisheries and Wildlife Programs are coordinating development of NPPC proposals to effectively address watershed resources on the Rainwater Wildlife Area, including instream fish habitat conditions and water quality and quantity.

- **Help protect or enhance natural ecosystems and species diversity over the long term.**

Perpetual protection and management of the 8,678 acres of upland and riparian habitats found on the Rainwater Wildlife Area provides habitat for 9 target wildlife mitigation species impacted by the John Day and McNary dams. Because of its size and location adjacent to National Forest System lands, the property will contribute to the protection and enhancement of resources, natural ecosystems, and species diversity in the northern Blue Mountain physiographic province on a landscape scale.

- **Complement the activities of the region's state and federal wildlife agencies and Indian tribes.**

The location of the Rainwater area and its management for resident and migratory wildlife and anadromous fish and water quality, directly complements federal and state land manager efforts to manage and protect resources in the local as well as regional area. The property abuts Washington State Department of Natural Resource lands on the north and Umatilla National Forest system lands on the south. In addition, the property is located entirely within the Ceded Lands of the Confederated Tribes of the Umatilla Indian Reservation. Habitat protection and enhancement of the property therefore meets CTUIR goals of protecting, restoring, and enhancing key wildlife habitats on the Ceded lands of northeastern Oregon and southeastern Washington (CTUIR Wildlife Mitigation Plan for the John Day and McNary Dams, Columbia River Basin, 1997). Furthermore, it promotes other key Tribal goals and activities including: 1) increasing opportunities for tribal members to exercise treaty rights reserved in the Treaty of 1855; 2) developing and promoting Tribal co-management and cooperative agreements with other federal, state, and tribal agencies for the benefit of biological and cultural resources in the Columbia Basin; 3) promoting regional/landscape biological diversity; 4) maintaining consistency with the Power Council Fish and Wildlife Program; 5) assisting BPA in meeting their wildlife mitigation obligations in a cost-efficient manner; 6) minimizing expenditures on mitigation planning and maximizing on-the-ground mitigation, enhancement, and protection of wildlife habitats.

- **Encourage the formation of partnerships with other persons or entities, which would reduce project costs, increase benefits and/or eliminate duplicative activities.**

The CTUIR has initiated and continued ongoing involvement of the WDFW, advisory committee, and the public to foster cooperative efforts on this project. Many of these activities will help build relationships with a wide range of potential project partners. By example, the WDFW Upland Habitat and Access Program, designed to provide landowners with upland habitat restoration funding and development/implementation/enforcement of access and travel management plans, is a partnership the CTUIR is currently developing. Other potential project partnerships that will be pursued in the coming years could include a wide variety of entities including but not limited to: U.S. Department of Agriculture, Forest Service and Natural Resource Conservation Service, Lower Columbia Audubon, Rocky Mountain Elk Foundation, National Wild Turkey Federation, etc.

Review Comments:

Reviewers raised a concern relative to the number of FTEs (N = 3.17) associated with this project.

Budget:

FY02	FY03	FY04
303,546 Category: High Priority	299,566 Category: High Priority	304,926 Category: High Priority

Project: 200003800 – Design and Construct NEOH Walla Walla Hatchery

Sponsor: CTUIR

Short Description:

Add incubation/juvenile rearing capabilities to the existing South Fork Walla Walla adult holding/spawnig facility to produce spring chinook salmon and aclimate summer steelhead for release in the Walla Walla River Basin.

Abbreviated Abstract:

In the mid to late 1990's CTUIR, ODFW, and WDFW began implementing a comprehensive Walla Walla Fisheries Restoration Plan. Funding for the structural fish passage (ladders and screens) and habitat enhancement is being provided by BPA and the US Army COE. Flow enhancement studies are being funded by the US Army COE. Artificial production facilities, an integral part of the restoration plan, are being proposed under this BPA funding proposal. Completed and ongoing passage, flow, and habitat improvements are expected to greatly enhance the benefits of the proposed hatchery project.

This project will provide incubation and rearing capabilities for approximately 500,000 spring chinook salmon and acclimation/release of 100,000 summer steelhead into the South Fork Walla Walla River. A Umatilla Hatchery Satellite Facility for spring chinook adult holding and spawning for the Umatilla and Walla Walla Basin programs already exists at the proposed South Fork Walla Walla River project site. The existing facility includes water intake and effluent treatment systems that are sized to accommodate the proposed new production facilities. Project master planning, NEPA compliance, final designs, and the NPPC project review process are scheduled for FY 2001 and 2002. Construction of Walla Walla spring chinook production facilities is proposed for FY 2002. Upon completion, the facility will be operated under the existing Umatilla Hatchery Satellite Facilities O&M project #8343500. The project is necessary to achieve spring chinook and summer steelhead adult return objectives to the Walla Walla Basin.

Relationship to Other Projects:

Project #	Title/description	Nature of relationship
8903500	Umatilla Hatchery O&M	Umatilla Hatchery will inclubate and rear Walla Walla stock summer steelhead prior to release at the South Fork Walla Walla Hatchery site.
8343500	Umatilla Hatchery Satellite Facilities O&M	The O&M project will provide for operation and maintenance of the facilities and M&E (production monitoring and coded-wire tagging) completed under this project.
20139	Walla Walla Basin Fish Passage Operations	The fish Passage project will provide adult recovery information, broodstock for spawning, and will trap and haul outmigrating hatchery produced juveniles during low water conditions.
20127	Walla Walla Basin Natural Production Monitoring and Evaluation	The M&E project will monitor the natural production success of fish produced under this project.
8805302	Design and Construct Umatilla Hatchery Supplement	The Umatilla Hatchery Supplement will also provide spring chinook production at the South Fork Walla Walla site. Design and construction for that project will be closely linked to this project.
9601100	Walla Walla River Juvenile and Adult Fish Passage Improvements	The passage project provides juvenile screening, bypass, and trapping facilities for increasing survival of all outmigrants in the Walla Walla Basin. The project also provides adult ladders to increase survival of adult migrants.
960460	Walla Walla Basin Fish Habitat Enhancement	The habitat project will enhance the natural production capability of habitat where some adult returns from this project will be spawning.

Relationship to Existing Goals, Objectives and Strategies:

The South Fork Walla Walla Hatchery will produce approximately 500,000 spring chinook yearling smolts for release into the South Fork Walla Walla River and possibly Mill Creek. Based on a spring chinook smolt-to-adult return estimate of 0.5%, approximately 2,500 adults will return to the Walla Walla subbasin. The project will also acclimate and release 100,000 summer steelhead smolts into the South Fork Walla Walla River. Based on a smolt-to-adult return estimate of 1.0%, approximately 1,000 adult steelhead will return to the Walla Walla Subbasin.

As stated in Section 9.b., artificial propagation is a key element in the comprehensive Walla Walla fisheries restoration program and is required in order to achieve spring chinook and summer steelhead natural production, broodstock, and harvest objectives in the Walla Walla Subbasin Summary (CTUIR et al., 2001). Adult return objectives to the mouth of the Walla Walla River are 5,500 and 5,650 spring chinook and summer steelhead respectively. Current returns for spring chinook are at zero and summer steelhead are at approximately 350 (15% of estimated historic levels) in the Oregon portion of the Walla Walla Basin where supplementation is proposed.

This proposal for hatchery production for the Walla Walla River was identified in the 1994 Council Fish and Wildlife Program under Section 7.4.L. Facilities constructed under this project will be an essential part of comprehensive Walla Walla River fish restoration plans developed by CTUIR, ODFW and WDFW in cooperation with the Council, BPA, US Army COE, Bureau of Reclamation (BOR), NMFS, and various irrigation districts and private landowners. The project will increase smolt production and will directly increase returns and survival of salmon and steelhead to the upper Columbia River Basin which is consistent with the Council's Fish and Wildlife Program, U.S. vs. OR Columbia River Fish and Wildlife Plan and the Pacific Salmon Treaty.

This project also addresses the Council's basin-level biological objectives listed in the 2000 Fish and Wildlife Program. More specifically, the project objective of assisting in spring chinook restoration by producing more smolts and ultimately more returning adults directly addresses Section III. C.2.a.1. (Increase total adult salmon and steelhead runs above Bonneville Dam by 2025 to an average of 5 million annually in a manner that supports tribal and non-tribal harvest). Also in Section III. D. 4, the primary strategy for artificial production states that artificial production can be used to compliment habitat improvements and replace lost salmon and steelhead.

Strategy 6 (use artificial propagation to reintroduce Carson stock spring chinook into the Walla Walla subbasin to provide natural production harvest) in the Walla Walla Subbasin Summary (CTUIR et al., 2001) specifically identifies actions directly related to this hatchery proposal. Action 6.1 calls for construction of a spring chinook hatchery and acclimation facilities. Action 6.3 calls for completion of appropriate pre-construction hatchery planning as per NPPC and other processes. Action 7.2 calls for rearing of 100,000 steelhead smolts at Umatilla Hatchery for acclimation and release in the South Fork Walla Walla River.

Review Comments:

This project should continue to move through the three-step process.

Budget:

FY02	FY03	FY04
150,000 Category: High Priority (Three Step Process)		

Project: 200003900 – Walla Walla Basin Natural Production Monitoring and Evaluation Project

Sponsor: CTUIR

Short Description:

Monitor and evaluate natural spawning, rearing, migration, survival, age and growth characteristics and life histories of adult salmon, steelhead, bull trout and mountain whitefish, and their naturally produced progeny in the Walla Walla River Basin

Abbreviated Abstract:

Our project goal is to provide information to managers and researchers working to restore anadromous salmonids to the Walla Walla River Basin. Ongoing and completed restoration projects include a hatchery development, dam removal, new ladders and screens, out-planting of surplus adult spring chinook salmon for natural spawning and instream flow enhancement. This project monitors naturally producing salmon, steelhead, trout and mountain whitefish in the basin. WDFW operates on the Washington side of the Basin and we operate primarily on the Oregon side. We work in Washington on the radio telemetry project and monitor salmonids in Mill Creek and on the South Fork of the Touchet River on Tribal administrated lands. The project objectives are to measure, estimate and report salmonid spawning success, rearing densities and abundance, and age and growth characteristics. This project also monitors habitat quantity and quality, adult passage facilities, smolt migration timing and survival, and salmonid life history characteristics.

Researchers and managers from throughout the basin will examine and modify this project during coordination meetings. We strive to provide the best information for adaptive management of basin salmonids. The information generated by this project also has utility for salmonid restoration efforts throughout the Columbia River Basin.

While certain monitoring activities are conducted each year, others objectives have been deferred to future years through prioritization, need, and limitations in personnel and funding. Physical habitat surveys, outmigrant surveys, adult passage facility evaluations and genetic monitoring are examples of this. Adult and juvenile passage evaluations begin in 2001. Genetic samples from endemic steelhead were collected in the Walla Walla Basin in 1999 and 2000. Geneticists will use both electrophoresis and DNA techniques to examine the genetic characteristics of steelhead throughout the Walla Walla Basin. This genetic information will be useful in evaluating supplementation and other management options for endemic steelhead restoration. Additional genetic monitoring may occur again in 2009.

Relationship to Other Projects:

Project #	Title/description	Nature of relationship
901100	Assess Fish Habitast & Salmonids in Washingtion	Our project coordinates M&E efforts with WDFW in the Walla Walla Basin by working primarily in the Oregon and Mill Creek areas while they work primarily in the Washington areas.

Project #	Title/description	Nature of relationship
9601100	Walla Walla River Juvenile and Adult Fish Passage Improvements,	Our project evaluates passage timing and success of juvenile and adult salmonids at the new passasge facilities.
20139	Walla Walla River Fish Passage Operations	Coordinate salvage and M&E efforts as conditions dictate.
20138	NEOH Walla Walla Hatchery Facility	Our project will measure the natural reproduction success of spring chinook salmon reared at this facility.
405400	Bull Trout Life History, Genetics, Habitat Needs and Limiting Factors in Central and North East Oregon	Coordinate M&E efforts in the Walla Walla Basin by forwarding all bull trout observations on to ODFW, and the Bull Trout Recovery Team
9506000	Lamprey Restoration	Our project provides all observations of lamprey to the lamprey project.
9604601	Walla Walla Fish Habitat Enhancement	Our project measures salmonid abundance, densities and distribution in habitat enhancement areas developed by this project as well in areas without enhancement.

Relationship to Existing Goals, Objectives and Strategies:

This project is the measuring tool of natural production restoration efforts in the Walla Walla River Basin as outlined in the NPPC Columbia River Basin Fish and Wildlife Program (measures 4.2A, 4.3C.1, 7.1A.2, 7.1C.3, 7.1C.4 and 7.1D.2; NPPC 1994). This project is also in accordance to the most recent NPPC plan which lists research and monitoring as the ninth strategy for recovery in the Basinwide Provisions (section III, NPPC 2000). The Walla Walla Basin fisheries restoration program is developing through planning and implementation efforts of CTUIR (1998), BPA (fish and wildlife plan) and NPPC. We provide detailed information regarding the natural spawning, rearing and migration success of bull trout, resident rainbow and summer steelhead. This project will monitor and evaluate adult steelhead and salmon passage after construction of the new ladders. We also evaluate the natural production success of out-planted surplus hatchery spring chinook that spawned naturally with good success in Mill Creek and the South Fork of the Walla Walla. Juveniles will be PIT tagged to examine outmigration success and four-year-old adults are expected to begin returning to the Walla Walla River in 2005. This project's fundamental purpose is to measure the success of salmon and steelhead restoration efforts and provide information for adaptive management. The information we provide also has utility for restoration efforts throughout the Columbia River Basin.

Review Comments:

No review comments.

Budget:

FY02	FY03	FY04
482,244 Category: High Priority	488,000 Category: High Priority	500,000 Category: High Priority

Project: 200020139 – Walla Walla River Fish Passage Operations

Sponsor: CTUIR

Short Description:

Increase survival of migrating juvenile and adult salmonids in the Walla Walla Basin by operating passage facilities, flow enhancement measures, trapping facilities, and transport equipment to provide adequate passage conditions.

Abbreviated Abstract:

In the 1990's, CTUIR and ODFW along with many other agencies began implementing fisheries restoration activities in the Walla Walla Basin. An integral part of this effort, as outlined in Section 7.11B of the 1994 Fish and Wildlife Program, is to alleviate inadequate tributary migration conditions as occur in the basin. These migration concerns are being addressed by removing diversion dams, constructing fish passage facilities, and initiating trap and haul efforts. Efforts are also underway to provide instream flows. The Fish Passage Operations Project objective is to increase adult and juvenile migrant survival in the Walla Walla Basin. The project provides survival benefits for migrating juveniles and adults by operating and maintaining ladders, screen sites, bypasses, trap facilities, and hauling equipment and coordinating these operations with flow conditions and diversion activities. The project also provides valuable support by refining fish passage criteria and providing technical expertise on passage facility design and operation. Recommendations based on project observations of migration are incorporated into subbasin management documents and technical recommendations have been included in the design of fish passage facilities in the basin. The project is viewed as a long term O&M project required for maintaining the survival advantages achieved by implementation of the fish passage projects in the basin being constructed under project number 9601100.

Relationship to Other Projects:

Project #	Title/description	Nature of relationship
9601100	Walla Walla River Juvenile and Adult Passage Improvements	Proposed project identifies passage improvements to be completed under project 9601100. Also provides technical input on facility designs and operational criteria and involved in operation and maintenace of facilities after completion.
20138	NEOH Walla Walla Hatchery Facility	After completion of hatchery facility, proposed project will provide adequate passage for juveniles produced at the facility and collect broodstock for production programs.
20127	Walla Walla Basin	Proposed project provides adequate passage for natural

Project #	Title/description	Nature of relationship
	Natural Production M&E	adults and juveniles to and from natural production areas. Also provides return data for natural adults and migration data on juveniles to project 20127.

Relationship to Existing Goals, Objectives and Strategies:

As stated in Section 9.b., inadequate passage conditions for both upstream and downstream migrants were the primary contributor to the extirpation of salmon and decline of steelhead in the Walla Walla Basin. Although many passage improvements have been implemented there are still critical times of the year when inadequate migration conditions exist. The objective of the project is directly related to the goals and objectives stated in the Subbasin Summary by assisting in the restoration of salmon and steelhead populations in the Umatilla River by increasing the tributary survival of migrating adults and juveniles.

There are two specific strategies in the Subbasin Summary which identify needed actions directly related to the Fish Passage Operations Project. Strategy 4 (*Protect, enhance, and restore instream flows to improve passage conditions and increase rearing potential for anadromous and resident fishes in the Umatilla River Basin.*) identifies three actions related to the project. Action 4.1 and 4.9 are to further understand flow limited stream reaches and Action 4.3 is to determine flow needs for migration and rearing. The project is also involved in other actions listed under Strategy 4.

Strategy 5 (*Restore or enhance fish passage for resident and anadromous upstream and downstream migrants.*) lists five actions in which the project is directly involved. Action 5.1 is to continue to identify passage and screening needs, Action 5.3 is to implement screening of all diversions, Action 5.4 is for operating and maintaining all fish passage facilities, Action 5.5 is to ensure adequate passage conditions exist, and Action 5.7 is for continuing trap and haul operations. The project is also involved in other actions listed under Strategy 5.

The Fish Passage Operations Project is also directly involved in Strategies 6, 7, 9, 10, 12, and 15. Under Strategy 6, Action 6.2, the project is responsible for the spring chinook outplanting program. For Strategy 7, Action 7.1, the project operates the Nursery Bridge ladder and trap and will collect broodstock for the Oregon steelhead program once initiated. Broodstock collection activities also fall under Strategy 10, Action 10.1. Under Strategy 12, the project monitors adult returns at Nursery Bridge Dam (Action 12.1), may be involved in Action 12.2, and operates the smolt trap at Little Walla Walla River (Action 12.5). The project also provides data on adult returns as applicable for activities conducted by other projects under Strategy 9 and, to a lesser degree, Strategy 15.

The project goal of assisting in the restoration and rebuilding of salmonid populations in the Walla Walla Basin is directly related to the Council's mandate to protect, mitigate, and enhance fish and wildlife affected by development and operation of the hydropower system. Though the project falls under the Columbia Plateau Ecological Province for which specific objectives and strategies will be adopted later, the project does address the Council's Basin-level biological objectives listed in the 2000 Fish and Wildlife Program. More specifically, the project objective of increasing tributary survival directly addresses the three items listed in Section III.C.2.a.1. (*Anadromous fish losses*); halt declining population trends, restore natural populations, and increase adult runs.

The Fish Passage Operation project is also indirectly involved in a number of the RPA actions listed in the NMFS 2000 FCRPS Biological Opinion. The project contributes data to studies identified under Actions 107 and 108 (Fish Passage Center gas bubble disease monitoring and headburn study and University of Idaho mainstem adult migration monitoring study) although this data is limited for the Walla Walla Basin. Although not specifically identified in Action 149 or 151, the project is involved in activities associated with those actions as listed under Section 9.6.2.1 (*Actions Related to Tributary Habitat*).

Review Comments:

The actual project number for this work is 200003300.

Budget:

FY02	FY03	FY04
109,551 Category: High Priority	115,029 Category: High Priority	194,300 Category: High Priority

New Projects

Project: 25017 – Fabricate and Install New Huntsville Mill Fish Screen

Sponsor: WDFW, YSS

Short Description:

WDFW, YSS proposes to fabricate and install a new fish screen facility (12 cfs) at the existing Huntsville Mill location within the Touchet River Basin. The new screen facility will comply with current state and federal criteria for fish protection.

Abbreviated Abstract:

The Washington Department of Fish and Wildlife (WDFW), Yakima Screen Shop (YSS) proposes to replace the Huntsville Mill fish screen facility located on the Touchet River, a tributary to the Walla Walla River. Obsolete Walla Walla basin fish screens constructed in the 1930's, 40's, 50's and 60's must be replaced or updated to comply with current, regional fish screen biological protection criteria adopted by Columbia Basin Fish and Wildlife Authority (CBFWA), Fish Screening Oversight Committee (FSOC) in 1995. The project objective is to provide 100 percent protection from mortality and/or injury for all species and life stages of anadromous and resident salmonids, including bull trout and steelhead trout that are listed as "threatened" under ESA (6/98 and 3/99, respectively). Old screens in the Walla Walla basin, and in other Columbia River sub basins, may provide fair protection for large (4-6 inch long) yearling smolts, but poor protection for fry and fingerling life stages. Mortality of fry and fingerlings by irrigation diversions may reduce subsequent smolt production and hampers efforts to restore depressed salmon and steelhead populations through natural production or hatchery supplementation. Biological evaluation of completed Phase II fish screen facilities by Battelle, Pacific Northwest National Laboratory (PNNL) under Project # 198506200 has quantified survival and guidance rates approaching 100% (ranging from 90 to 99%). Consequently, the state and federal fish agencies and Confederated Tribes of the Umatilla Indian Reservation (CTUIR) propose to complete replacement or upgrade of all obsolete fish screen facilities in the Walla Walla basin.

Relationship to Other Projects:

Project #	Title/description	Nature of relationship
199601200	Walla Walla Basin Anadromous Fish Passage	This project will aid in basin wide efforts to protect and restore ESA "threatened" steelhead and bull trout, and other anadromous (and resident) species.
198506200	Evaluation of Yakima Passage Improvements (PNNL)	Fishery scientists from the Battelle, Pacific Northwest National Laboratory (PNNL) periodically evaluate completed screening projects. Independent hydraulic and biological evaluations provides valuable "adaptive management feedback".

Relationship to Existing Goals, Objectives and Strategies:

The NWPPC and BPA have made substantial investments in the Walla Walla basin anadromous fish recovery effort. These investments are considered Aoff-site≅ mitigation for habitat losses elsewhere in the Columbia River, and are predicated on the fact that substantial wild salmon production potential still exists because of large expanses of accessible, high quality spawning and rearing habitat still exists in parts of the basin. Improved juvenile fish survival at Walla Walla basin gravity water diversions is widely believed to be important in improving overall egg-to-smolt survival of critically depressed stocks of naturally-produced steelhead trout.

NMFS 2000 Biological Opinion & Reasonable and Prudent Alternatives (RPA)

The Biological Opinion (BiOp) encourages the Action Agencies to support a Basin wide Recovery Strategy. The following information is included to demonstrate that this proposal will support the BiOp.

The BiOp lists measures to avoid jeopardy, and gives specific tributary habitat objectives, which include providing passage and diversion improvements, and supporting overall watershed health of riparian and upland habitat.

RPA Action 149 Addresses passage and **screening** problems, while initially specifying 3 priority areas (Lemhi, Methow, Upper John Day), it indicates that the program should be expanded, in coordination with NWPPC. The BOR is designated the lead. At the end of 5 years, work will be underway in at least 15 sub basins, with a 10-year window to achieve results.

CBFWA Program (final 2000 CRB Fish and Wildlife Program, Nov 30, 2000, # 2000-19)

This proposal is consistent with the High Priority Projects listed in the CBFWA program, including to:

- Demonstrate that project addresses:
    1) imminent risk to listed species, and
    2) has direct benefits.
        - Connect patches of high quality habitat or extend habitat;
        - Meets multiple priority objectives;
        - Collaborative effort with synergistic effects;
        - Recommended by an action plan;
        - Approved by state or tribal plan.

Examples given in the CBFWA Program include irrigation screens and passage (including culvert replacement) and supporting local ESA recovery efforts.

Subbasin Summary for Walla Walla , March 2, 2001

This proposal supports specific key fish recovery elements described in the Walla Walla sub basin Summary, specifically screening (fabrication and installation). This proposal also encourages fish recovery by providing access to habitat that is free of unscreened diversions.

Review Comments:

Recommended for funding by the NWPPC through the Action Plan Process.

Budget:

FY02	FY03	FY04
102,217 Catergory: High Prioity	120,000 Catergory: High Prioity	10,500 Catergory: High Prioity

Project: 25065 – Forward Looking Infrared Radiometry (FLIR) Thermal Imagery and Analysis of Tucannon River, Touchet River, and Mill Creel (FY2002) with follow-on 2003-04

Sponsor: WA Ecology, WQP

Short Description:

Obtain thermal imagery, imagery analysis, and supporting instream data, to map areas of thermal refugia and areas of heating in order to assess habitat condition and to provide data for restoration efforts, particularly Total Maximum Daily Loads (TMDLs).

Abbreviated Abstract:

Washington's Department of Ecology proposes to enhance fish species survival and reproduction by mitigating high temperatures within key waterbodies of the Columbia Basin. This proposal outlines the integration of recent technology, previously used successfully by the State of Oregon, to establish load allocations and adjust temperature levels within fish bearing streams. The results of these projects will be used to directly affect the design and implementation of restoration work in the area.

Many stocks of anadromous fish use streams and rivers in the Walla Walla, Palouse, and Crab Creek sub-basins for spawning, incubation, and rearing. The waters of these streams are the basic habitat within which fish live, survive, and reproduce. These and other waterbodies have been found to have temperature levels which are harmful to fish survival and reproduction. Pollution of these waterbodies presents a threat to the survival of species.

Under section 502(6) of the federal Clean Water Act, heat is defined as a pollutant. Elevated temperature can stem from point sources of heat, such as industrial and municipal discharge, as well as from increased exposure of the water to solar radiation. Solar radiation striking the water or surrounding land can provide the energy for an increase in temperature. There generally is an increased influx of solar radiation when the natural characteristics of the stream and/or surrounding land are altered. Most of the sources of thermal input are nonpoint sources. The primary anthropogenic cause of elevated temperatures in rivers and streams is increased solar radiation due to widening of streams or loss of shading vegetation. Other factors that affect temperature are tributary inputs, ground water flow, point source discharge, and topographic shading and hydrologic modification.

In order to mitigate the effects of potential sources of heating, it is necessary to identify the sources. It is difficult to delineate the effects of these factors across broad river systems using current methodologies. The current methods for temperature monitoring uses instream temperature loggers that measure temperature at single points in the stream. While these methods are important to obtain temporally consistent data at each of these singular points, temperature can vary by several degrees within several meters of the logger without it detecting these differences.

What is needed is spatially continuous data to complement the temporally continuous data that is the current paradigm. Currently the most appropriate technology for spatially continuous temperature monitoring in rivers and streams is airborne Forward Looking Infrared Radiometry (FLIR) and its technical analysis. In addition to the raw thermal imagery, color video imagery of the site is valuable for assessment of the condition of stream banks and riparian vegetation. In order to coordinate the FLIR and video imagery and to reference the images to a specific geographic location, differential Geographic Positioning System (GPS) data must be collected concurrently with the other data. After collection the data must be assimilated, coordinated and presented in a form which can be read by Geographic Information System (GIS) applications such as ArcView for validation of temperature models used in the development of Total Maximum Daily Loads (TMDLs).

The imagery would also aid in public outreach by enabling stakeholders to assess the streams condition down to local reaches that are directly affected by their actions or

that have a direct bearing on their property. Perhaps the greatest contribution of FLIR technology is the ability to specifically display thermal habitat fragmentation of isolated cool-water refugia separated by warmed reaches. By mapping the extent of source (heating) and cool thermal refugia areas in these sub-basins, a baseline for long-term recovery of fish populations will be established.

Relationship to Other Projects: (not applicable)

Relationship to Existing Goals, Objectives and Strategies:

Elevated water temperature is known to detrimentally affect salmonids as well as other fish groups. The draft Walla Walla sub-basin study (Saul, et al. NWPPC, 2001) states that unsuitable temperature is a factor that limits salmon and lamprey production in the Touchet, Walla Walla, and Mill Creek sub-basins. While studies (Hallock, D. and Ehinger, W., 1999 Mendel et al., 1999) have evaluated temperature to some degree in the Walla Walla sub-basin more detailed and extensive work is needed. The 2001 draft report on the Walla Walla sub-basin prepared for NWPPC states:

> "Scientific investigation and characterization is needed to identify the location and effect of ground water input, tributary input, cold water habitat, and temperature profiles as they relate to cold-water refugia. These efforts will allow managers to target areas in need of mitigation and/or protection under state authority. The most effective methodology to rapidly produce this data over large geographical expanses is the Forward Looking Infrared Radiometry (FLIR) technology."

By performing this FLIR analysis we can address the needs identified in this report and provide the data needed to focus restoration resources where they are needed. This will allow for a maximization of return for restoration investments. The FLIR data will also be a key factor in the preparation of Ecology's Water Quality Restoration Plans (TMDLs) which will bring additional restoration resources to the basin.

Review Comments:

FLIR may provide a better understanding of the thermal characteristics of the watersheds. However, the proposal was not organized well enough to describe the use of the equipment. Reviewers suggest that BPA has the equipment to do this work and would be able to do it at a much lower cost. This appears to be a worthwhile work. However, the associated projected costs are high and the work could be done for less.

Budget:

FY02	**FY03**	**FY04**
231,000 Category: Recommended Action	201,500 Category: Recommended Action	201,500 Category: Recommended Action

Project: 25066 – Manage Water Distribution in the Walla Walla River Basin

Sponsor: OWRD

Short Description:

Implement needed water measurement and monitoring improvements and increase water management as flow restoration projects and actions are implemented in the Walla Walla Basin.

Abbreviated Abstract:

The project will provide enhanced water measurement and management capabilities which are essential to the success of other proposed projects to acquire instream water rights for the purpose of maintaining streamflows in the Walla Walla River at Milton-Freewater. Historically, the river has been dewatered during summer months below the Nursery Bridge dam which is used to divert water from the Walla Walla River into the Little Walla Walla system. The Little Walla Walla system serves as a distribution system for delivery of water to approximately 95 individual points of diversion.

Several organizations including the Bonneville Power Administration, National Marine Fisheries Service, Oregon Water Trust, and Confederated Tribes of the Umatilla Indian Reservation are considering, among other options, acquisition of water rights and transfer or lease of the rights instream. These acquisitions will establish legal protection for streamflows in the Walla Walla River. However, the success of any such project to dedicate flows instream below the Little Walla Walla diversion dam will depend on the OWRD's ability to measure and distribute water consistent with the water rights in the basin and to protect the flows instream.

Oregon's water law can accommodate efforts to increase flows in the Walla Walla River through leases and transfers to instream water rights and the allocation of conserved water. Protection of flows allocated to instream uses through these programs will depend on the adquacy of the water management resources available to OWRD and will require significant improvements in water measurement in the basin. The proposed project will provide both the water management and measurement resources which are needed.

Relationship to Other Projects:

Project #	Title/description	Nature of relationship
199604601	Walla Walla River Basin Fish Habitat Enhancement	The project would support habitat improvement efforts by aiding the the improvement of streamflows in the Walla Walla River downstream of the Little Walla Walla River diversion.
199601200	Anadromous Fish Passage at Walla Walla	The project would aid in efforts to provide adult passage diversion dams by protecting flows instream past the dams.
20524	Multi-Year Plan Walla Walla Anadromous Fish Plan	The project would support instream flow augmentation tasks by ensuring that water acquired would be protected instream.

Relationship to Existing Goals, Objectives and Strategies:

This project will work as a critical and necessary element of efforts to restore streamflows to the Walla Walla River through transfers and leases of water rights instream and to establishment of instream water rights through allocations of conserved water. Several organizations including the Bonneville Power Administration, National Marine Fisheries Service, Oregon Water Trust, and Confederated Tribes of the Umatilla Indian Reservation are considering acquisition of water rights and transfer or lease of the rights instream. These efforts will establish legal protection for instream flows.

The Walla Walla River Subbasin Summary identifies the importance for OWRD to develop a clear understanding of all water uses and to closely monitor and enforce water law. Actions 4.4 and 4.5 involve the establishment of instream water rights through transfers, leases and allocations of conserved water. Action 4.6 involves increased monitoring of water use and instream flows to increase streamflows. Effective implementation of these actions depends on making sufficient resources available to OWRD to more intensively monitor streamflows and water use to ensure that water is distributed according to the water rights of record.

The 2000 Columbia River Fish and Wildlife Program includes recommendations that BPA establish a fund to provide an expeditious method for acquiring water rights and to give preference to proposed acquisitions which would address risks to listed species. The 2000 FCRPS Biological Opinion includes several actions, the success of which will depend on the availability of sufficient resources to manage water and water use. Action 149 commits the Corps of Engineers to implementation of restoration actions in the Walla Walla River Basin. Action 151 commits BPA to experiment with ways to increase tributary flows using methods such as establishment of a water brokerage.

OWRD is working to improve water measurement and management capabilities in the basin. In recent years, approximately 20 headgates and 25 measuring devices have been installed at water diversions in the basin. In addition, OWRD is working closely with the involved agencies to assist in flow restoration efforts. These activities have represented a significant increase in workload. Continued efforts to secure instream water rights and to restore streamflows will further increase the demands on OWRD’s resources. In the absence of sufficient resources, OWRD will not be able to ensure the success of the other organizations’ efforts to secure water for instream purposes.

Review Comments:

This proposal would provide the monitoring component that allows for the detection of noncompliance water withdrawal activities. The reviewers suggest that it appears that the financial responsibility for this work is that of the Oregon Water Resource Department and question the appropriateness of funding these activities.

Budget:

FY02	FY03	FY04
552,525 Category: High Priority	498,799 Category: High Priority	345,976 Category: High Priority

Project: 25076 – Enhancing Riparian Corridors Sustainably With Integrated Agroforestry

Sponsor: IWF

Short Description:

Enhance streamflows, water quality, fish and wildlife habitat, and physical stream functions in irrigated agricultural stream corridors while also enhancing community economy and social welfare through sustainable, integrated agroforestry systems.

Abbreviated Abstract:

> *"[Restoration] will not happen by regulation, changes in the law, more money, or any of the normal bureaucratic approaches. It will only occur through the integration of ecological, economic and social factors, and participation of affected interests*."
>
> —*Letter of Agreement, BLM & Forest Service, March 20, 1996*

In July 1997, the National Riparian Service Team drafted an interagency strategy, entitled *Accelerating Cooperative Riparian Restoration and Management*, that added:

> *"Because riparian-wetland areas often pass through or are shared by numerous landowners, a collaborative approach applied at the ground level, in a watershed context, is the only avenue to successful restoration and future management."*

This is exactly what our proposal is about.

The Walla Walla Agroforestry Program is a ground level, watershed-scale program designed specifically to integrate ecological, economic and social factors for sustainable riparian restoration in irrigated agricultural stream corridors.

Our primary objectives are to:

- Help BPA and other regulatory agencies achieve and preserve Proper Functioning Conditions in agricultural stream corridors by enhancing streamflow, water quality, and fish and wildlife habitat.
- Help owners of irrigated agricultural land comply with environmental regulations while making productive and profitable use of their land and water resources.
- Help the citizens of the Walla Walla watershed culture a sustainable future — a healthy ecology, sound economy and strong social fabric — by meeting ecological needs while optimizing wealth generation and preserving the agrarian culture of the community.

Our primary tool for achieving these goals is an innovative agroforestry strategy integrating two major components into a holistic, comprehensive solution:

- In riparian corridors directly adjacent to streams, we will re-establish Proper Functioning Conditions by encouraging proper physical stream functions and — where appropriate — enhancing riparian buffer vegetation with native trees and plants indigenous to the Walla Walla watershed. Our methodology will incorporate principles used and promoted by the National Riparian Service Team, especially with regard to *functionality* as the basis for assessment, restoration strategy selection (passive and/or active), design and implementation. We will also culture a common understanding with landowners and others regarding the rationale and expected results of the restoration.

- On the irrigated agricultural uplands, we will implement profitable agroforestry systems, employing proven silvicultural, precision irrigation and biological farming methods to produce high-value wood products, conserve water and energy, generate extensive upland shading and wildlife habitat, reduce tillage and chemical inputs, enhance and stabilize soils, and sequester atmospheric carbon in wood and the soil.

We intend to implement this strategy on 10,000 acres of irrigated agricultural land — including over 50 miles of riparian corridor — over an 8-to-10-year period.

On this scale, the Walla Walla Agroforestry Program will:

- Establish Proper Functioning Condition on over 50 miles of stream corridor running through irrigated agricultural land
- Conserve on the order of 30 cubic feet per second (10,000 acre-feet per year) of irrigation water and transfer this water to augment instream flows
- Reduce ambient air temperature in riparian uplands by 15-to-20°F through extensive shading by semi-permanent tree crops
- Sequester up to 2 million metric tons of airborne carbon dioxide
- Ensure full regulatory compliance with water rights, fish screening and flow metering for about one-fifth of the irrigated agricultural land in the Walla Walla watershed
- Produce over 30 million board feet of solid wood per year, generating farm-gate revenues of $12 million per year and value-added processing revenues on the order of $60 million per year
- Cost-effectively utilize municipal wastewater and biosolids and improve nutrient cycling for at least one, and probably more, of the local municipalities
- Preserve, if not enhance, agricultural employment opportunities and sales of agricultural equipment
- Enhance educational opportunities related to the introduction of new agricultural production methods and environmental restoration strategies
- Clearly demonstrate to other Pacific Northwest communities that good environmentalism can work economically and socially, and that sound resource stewardship is the heart of community life and a sound, sustainable economy.

In the mid- to long-term, the financial prospects for this program are very good — and this program will likely become independently sustained through private enterprise. However, substantial barriers must be overcome to progress to that point. These barriers have severely hampered progress through the past six years of concept development. Only personal passion and small-scale, private-sector commitment have produced and preserved this unique opportunity.

Simply put, agroforestry production is a long-term venture that does not fit the conventional systems for financing agricultural crop production. Agricultural wood production demands a substantial investment up front and a relatively long wait to the harvest — at least eight years — before the investment can be recovered and profit gained. For the established agricultural industry, where annual cashflow is the norm, an eight-to-ten-year payout has proven to be an unacceptable proposition for conventional agricultural financiers.

Ironically, the same socio-economic conditions that make switching to this ecologically-beneficial crop attractive, also make financing practically impossible. With most farmers already in debt and facing mounting economic, environmental and social pressures, financing is simply not available for a crop that requires a significant wait for a return — a period longer than both wine grapes and apples. In light of the time to payout and perceived risks, landowners are unwilling to mortgage their land to collateralize this proposition.

BPA can change this situation.

Our six-year, privately-funded effort to cultivate this industry has clearly shown us that the key to large-scale implementation of sustainable, community-based agroforestry is ***publicly-sponsored, risk-mitigated financing***. A large-scale, sustainable, community-based program is not going to occur without it.

Our proposed financial mechanism is the Walla Walla Agroforestry Fund — a combination Grant and Revolving Loan fund financed by BPA that provides the working capital required to implement our integrated agroforestry systems on a watershed scale:

- The Revolving Loan component will finance the development and management of the profitable upland plantations with favorable terms that underwrite the risk of agricultural wood production. In exchange for acceptance of this financial risk, BPA projects will acquire for the public:
  - ✓ enhanced riparian corridors to allow Proper Functioning Condition, including preservation of these corridors in perpetuity;
  - ✓ transfer of conserved irrigation water to instream flows for the duration of the plantation crop cycle; and
  - ✓ full compliance with environmental regulations pertaining to water rights, fish screening and flow metering.
- The Grant component will fund the development, promotion and administration of the Walla Walla Agroforestry Program, as well as the planning, development, operations, maintenance and monitoring of riparian corridor enhancements.

The first five years of the program will develop about 4,250 acres of upland plantations and 325 acres of riparian corridor, requiring loans totaling $8 million, grants totaling $3 million, and private equity totaling $5 million.

Relationship to Other Projects:

Project #	Title/description	Nature of relationship
	WDFW Fish Screening Program	Integrate screen upgrades into integrated program seeking comprehensive compliance with environmental regulations
	BPA Conserved Water Lease Program	Enhances scope to recognize and capture opportunities for partial curtailment of water use
	OR & WA Water Trust Programs	Enhances scope to recognize and capture opportunities for partial curtailment of water use
	WW Conservation District CREP/SRFB Projects	Illustrates improved methods for PFC assessment and restoration

Relationship to Existing Goals, Objectives and Strategies:

Two-thirds of the land area of Eastern Washington is part of a watershed with a species of trout or salmon listed under the Endangered Species Act. In fact, the only Washington species listed as endangered is in Eastern Washington.

The Walla Walla River epitomizes the major problems facing Eastern Washington. The river contains two species of salmonids listed as endangered. Water in the Walla Walla watershed is over-appropriated. During the summer months, irrigation often causes the Walla Walla to run dry. Agricultural uses have absorbed much of the riparian zone. When the water reaches the river it is often polluted by agricultural runoff containing chemicals. If that is not enough, the water becomes overheated through lack of shade.

Despite the clear need in Eastern Washington, salmon recovery efforts in the area have lagged behind. The bulk of the work and funding for habitat restoration has been invested in Western Washington.

Washington State agriculture is on the horns of a dilemma. Environmental and economic challenges demand that it change. The present agricultural recession severely reduces the industry’s capacity to conceive and make necessary changes. But, if changes are not made, the current structure of our agricultural system — the crops and how they are produced — will continue to make matters worse. We will generate more pollution, overuse land and water, and fall even further behind in the global markets in which we compete.

What is needed to break through this barrier of adverse and conflicting economic and environmental dynamics is a model that reverses them. We need a model that integrates good farm economics with good environmental protection.

As key tributaries of the Walla Walla River, Yellowhawk and Garrison Creek manifest the problems peculiar to the Walla Walla watershed as well as the general regional problems. Its natural areas and habitat have been cultivated or otherwise degraded. During the summer months, its water flow sinks below minimal standards and the remaining water is warm and polluted. Its capacity to support fish is critically impacted by human activities.

Yellowhawk and Garrison Creeks flow through both urban and agricultural zones on their path to the Walla Walla River. The habitat for steelhead, salmon and brown trout have been degraded. These two creeks, as with much of the Walla Walla River watershed, are challenged by three connected problems: water withdrawals for irrigation; the cultivation or habitation of land virtually to the water's edge; and pollution. Rehabilitation of the habitat on these creeks demands that the solutions to these problems be linked as well — through water conservation, restoration of riparian habitat, and reduction of pollutants.

In and of itself, the need to restore Yellowhawk and Garrison Creeks and to contribute to the recovery of salmonids in the watershed is great. Given its importance to the watershed, its discrete scope, and its close proximity to the area's population centers, its capacity to meet the need for a major demonstration project and community education is even greater.

By meeting the critical needs for habitat restoration that can be effectively applied within the context of working agriculture, this project begins the process of meeting this same need region-wide. The approach and methods of this project can be readily replicated throughout the region. This project will demonstrate how the barriers now preventing action on behalf of salmon can be breached: the debilitating conflict between environmentalists and landowners; the financial gap between available public funds and what is needed to implement projects on economically valuable land; and what is seen as good farming practice in the conventional approach of good biological management. We contend that good demonstration promoted by agricultural practitioners, at the present time in the present context, is worth more than all the pages of regulations, plans, and treaties, which can be added to the documentation we now have.

While demonstrating a practical approach to salmon recovery is paramount, the direct impact of this project on the Walla Walla River system is of no small importance.

- <u>This project produces important results in and of itself</u>. It will restore and enhance the riparian zone and its associated habitat along 12,000 feet of the course of two key tributaries to the Walla Walla River. This will increase the productivity of Yellowhawk and Garrison Creeks by increasing capacity for spawning and by increasing the survivability of young steelhead, salmon and resident brown trout.
  In addition, the combined water saved both in the restored riparian zone and the upland zone will equal 300 acre-feet per year, adding about one cubic foot per second of streamflow to Yellowhawk and Garrison Creeks per year. Most of this gain will come in the critical summer months.
- <u>Funding this project will advance the larger Walla Walla Agroforestry Program</u>, of which this project is an essential part. The Walla Walla Agroforestry Program project aims to restore and protect the most degraded and vulnerable segments of the Walla Walla River system and restore the river to normal stream flows. In order to accomplish this goal, the project aims at converting 10,000 acres of upland transitional zone to sustainable cropping and restoring 500 acres of riparian zone to their natural state. This project will contribute to accomplishing this goal by initiating this process, and more importantly, providing landowners a model for how they can make good stewardship work for them. This project will establish an organization of community partners with the capacity to carry the Walla Walla Agroforestry Program forward.

- Funding the project will build the kind of partnership necessary to make effective salmon restoration work possible in agricultural communities. It is no secret that the agricultural industry and agricultural communities are far from being fully involved in salmon recovery efforts. Active farming enterprises in particular are on the sidelines, because they have yet to find a way to conceive, plan, and implement salmon recovery efforts with farming. This project begins with active landowners and farmers conceiving of salmon recovery as an agricultural activity. Their up-front involvement has meant the creation of an approach that works for farmers. In short, the process of developing a working partnership of landowners, an environmentally-oriented agricultural firm, and environmentalists parallels the production of a model product and is an important contribution in its own right.
- Funding this project will provide a vehicle for education on salmon recovery. Education through this project will happen on three levels. First, as has been previously stated, this project will demonstrate a new integrated approach to salmon recovery in agricultural areas. Second, it provides the opportunity to test and refine techniques both for bringing farmers and environmentalists together, and for balancing economic and environmental values on the practical level. Third, the landscape resulting from this project will become a living classroom for the community.

Review Comments:

Although this project was conceptually accepted through SRFB, there was a concern about the associated costs and the eventual harvest of the trees. The watershed council in the area of this proposed work also expressed concern about the proposed costs. The costs associated with this proposal are high relative to the amount of habitat (40 acres) and the riparian buffers are narrower than NMFS's properly functioning conditions (50 feet). There is no guarantee that the riparian habitat and gained cfs will be preserved. In addition, there is no guarantee that pulp prices will remain high enough to maintain the program. As an experiment, the scale of this project should have been much smaller.

Budget:

FY02	FY03	FY04
Category: Do Not Fund	Category: Do Not Fund	Category: Do Not Fund

Project: 25082 – Walla Walla River Flow Restoration

Sponsor: WWBWC

Short Description:

This proposal will add 5 to 7 cfs of conserved irrigation water to the Walla Walla River at the critical flow-impaired reach between the town of Milton-Freewater and the Oregon-Washington state line

Abbreviated Abstract:

Fish need water.

This proposal will restore flows for passage and rearing in the most critically flow impaired segment of the Walla Walla River. This project is designed to insure that conserved water is accounted for and protected by Oregon Water Law. This proposal requires cost share funding for willing landowners and irrigation districts to implement irrigation and delivery efficiency projects, thereby leaving saved water in river for bull trout, steelhead, and reintroduced spring Chinook.

Additional efforts to return water to the river are being planned, however this proposal is urgently needed to avoid seasonal stranding of steelhead and bull trout. In recent years, thousands of salmonids are seasonally "rescued" and transported to suitable upriver habitat from a highly impacted three-mile segment near Milton-Freewater, Oregon.

This project complements, and enhances the cooperative work to increase flows and eliminate passage barriers being implemented by the Confederated Tribes of the Umatilla Indian Reservation, the Army Corps of Engineers, the Walla Walla Conservation District, the Oregon Watershed Enhancement Board, landowners, the Irrigation Districts, and the Walla Walla Basin Watershed Council. This project complements the Walla Walla Conservation District's (BPA FY 2001 High Priority) project to increase in stream flows on the Washington half of the river.

This project was identified as a priority during the ongoing Bi-State Habitat Conservation Planning Process with NMFS and USFWS Increasing flows is an identified strategy in the Walla Walla Subbasin Summary and in the Draft Bull Trout Recovery Unit Team list of actions.

This project will install on-the ground projects as part of a subbasin wide collaboration to improve fish habitat, passage, and production.

Relationship to Other Projects:

Project #	Title/description	Nature of relationship
20035	OWT - Water Rights Acquisition	Oregon Water Trust leasing expertise and funding for saved water from this project
9604601	CTUIR - Walla Walla River Fish Habitat Enhancement	flows from this project complement habitat work
1996011	CTUIR - Walla Walla River Juvenile/Adult Passage Improvement	Increased flow from piping, conservation will help improve passage.
23046	WWCD - Increase In Stream Flows to Walla Walla River	This Oregon project complements flow improvement work in Washington portion of the Walla Walla subbasin
20138	CTUIR - Northeast Oregon Hatchery Walla Walla Hatchery Facility	flows will permit passage to spawning habitat for returning adults

Project #	Title/description	Nature of relationship
21127	CTUIR - Natural Production	increased flows will enhance natural production
2139	CTUIR - Walla Walla River Fish Passage Operations	flows will improve passage at Nursery Bridge Fishway

Relationship to Existing Goals, Objectives and Strategies:

This proposal implements recommendations from the 1994 Columbia River Basin Fish and Wildlife Program.

7.8H "Salmon and Steelhead need adequate river flows for spawning, rearing and migration. With growing development pressures on streams, there is a need to find innovative ways to leave more water in streams."

7.6D ",,,acquiring in stream flows as needed for fish production."

7.8G "…acquire water rights on a voluntary basis by purchase, gift, or through state or federal funding of water conservation or efficiency improvements that produce water savings."

This proposal implements the 2000 Columbia River Basin Fish and Wildlife Program Objectives for Biological Performance, specifically:

"Protect and expand habitat and ecosystem functions as the means to significantly increase the abundance, productivity, and life history diversity of resident fish…"

This proposal implements recommendations from the Walla Walla Subbasin Summary's

Strategy 4.

Action 4.4 "Increase instream flows by lease or purchase of water rights."

Action 4.5 "Increase stream flows by improving the efficiency of irrigation systems and use of conserved water for instream use."

Action 4.6 "Increase monitoring of water use and instream flows. Use collaborative efforts or enforcement of existing regulations and water rights to increase available instream water."

Action 4.8 "Evaluate efforts to protect, enhance, and restore instream flows."

Action 4.9 "Continue to refine knowledge of flow limited stream reaches and results of enhancement efforts to address remaining needs."

This project was identified as a need in the Upper Walla Walla Basin Action Plan(BOR), the Walla Walla River Reconnaissance Report(CoE).

Review Comments:

There needs to be coordination with WRD relative to the installation of headgates to avoid duplication. Instream flows have been identified as a limiting factor in the Walla Walla Subbasin. This project will allow for significant instream flow benefits (5-7 cfs increase). All conserved water will be legally protected.

Budget:

FY02	FY03	FY04
478,000 Category: High Priority		

Project: 25094 – Restore Touchet River Watershed Habitat to Support ESA listed Stocks

Sponsor: CCD

Short Description:

Implement, assess, and monitor habitat cost-share projects coordinated through the Touchet River Watershed Program, a "grass roots" public and agency collaborated effort to restore salmonid habitat on private and public property.

Abbreviated Abstract:

The Touchet River is currently home to ESA listed stocks of steelhead, & bull trout. The upper reaches of the Touchet River, within Columbia County, Washington, are the spawning and rearing reaches for steelhead and bull trout. Protection, enhancement, & restoration of salmonid habitat is guided by the Touchet River Watershed Program, consisting of federal, state, & local resource agencies & government, tribes, citizens, & local landowners. The Program is led by the Columbia Conservation District.

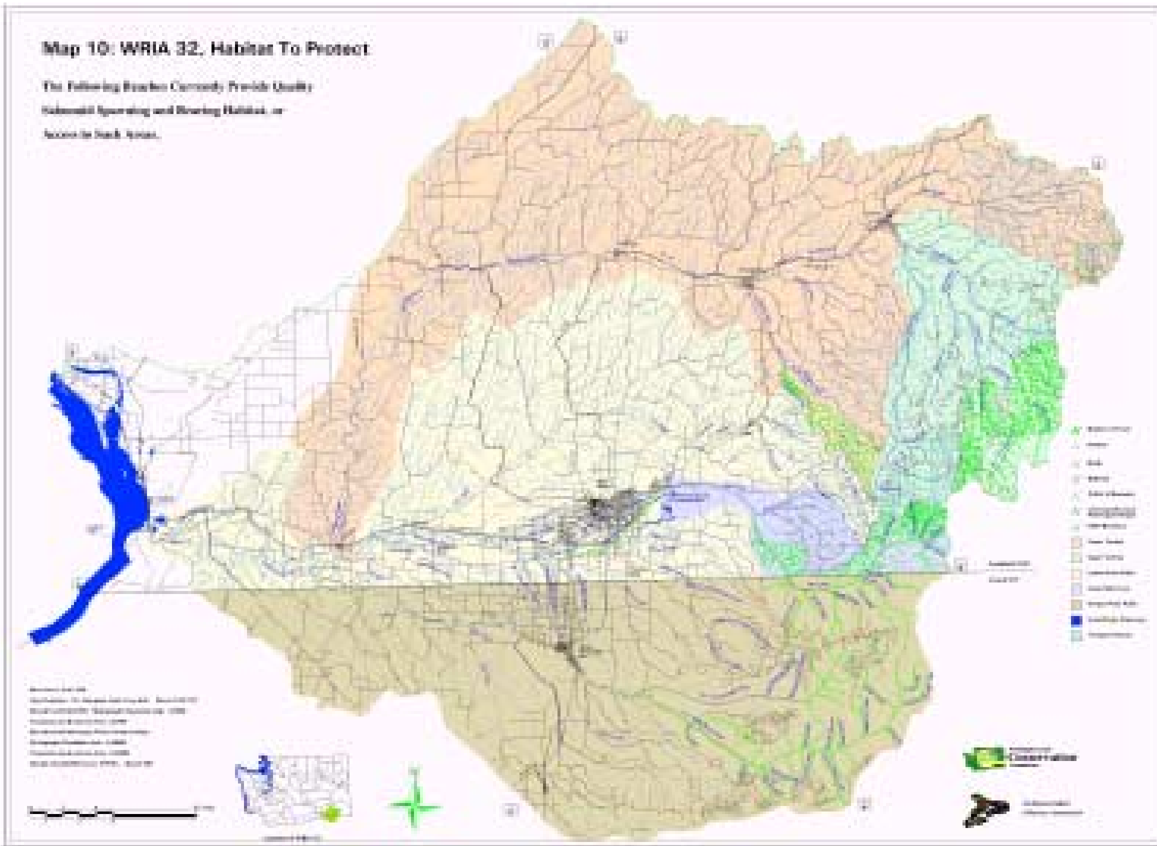
Multiple assessment, conducted under direction of the District, have identified high stream temperatures & sediment levels in spawning gravels, lack of complex rearing & resting pools, and geomorphic instability as critical limiting factors affecting habitat productivity. Restoration efforts to correct these limiting factors are designed to accelerate & complement the natural ecological processess.

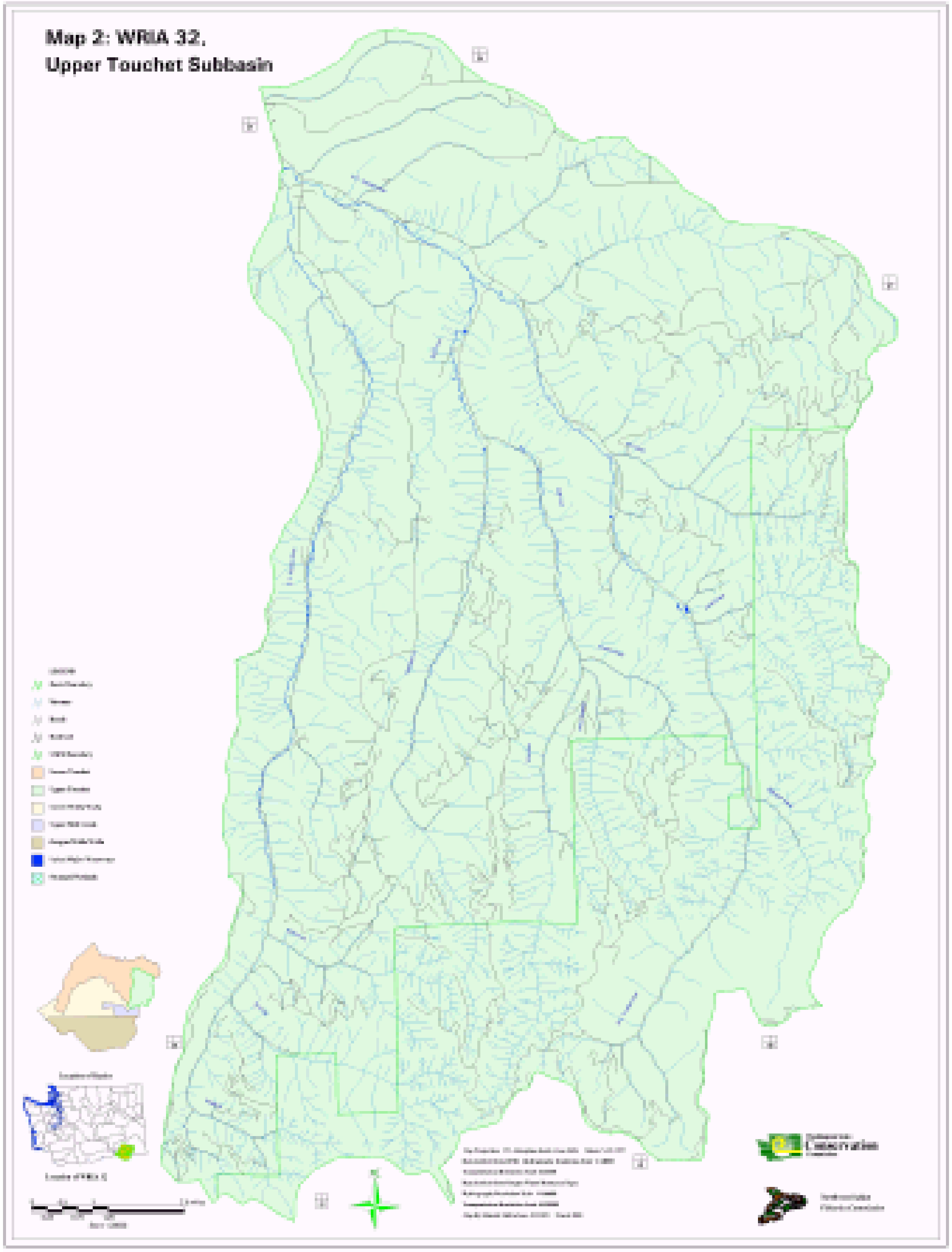
The goal for the Touchet River Watershed Program is improved capacity of habitat to support viable ESA listed populations. This goal supports the Columbia Basin Fish & Widlife Authority Co-manager's and the Walla Walla Subbasin Summary goals of improved adult holding, spawning and juvenile rearing survival. Biological outcomes of improved survivability will be affected by, increasing pool and spawning habitat quality & quantity through geomorphic stabilization, riparian bio-function restoration, increasing complexity, maintenaning adequate flow, and reducing water temperature & sediment embeddiness.

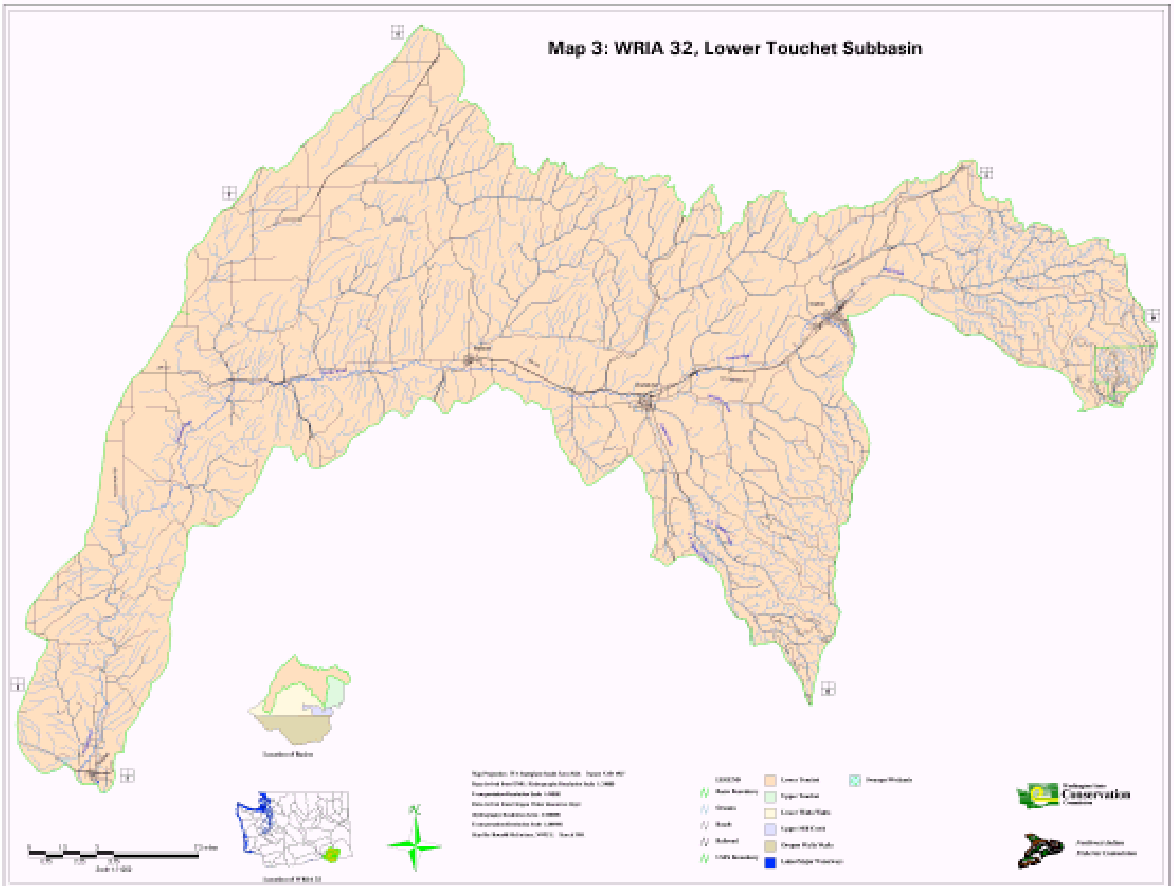
Projects will be designed to incrementally move toward desired biological outcomes by addressing identified limiting factors, the 2000 Columbia Basin Fish and Wildlife Program (Program) Habitat Strategies, and NMFS Biological Opinion Habitat RPA Actions 149,150, 151, and 153.

Habitat improvements are monitoried to determine project effectiveness to achieve biological goals and guide adaptive management stratigies. Assessments are done in collaboration with WDFW, WSU, USFS, & NRCS.

The district's opportunity to match funds with State Salmon Recovery Funding, utilize a long standing partnership with USDA NRCS for technical support, continue project partnerships with WDFW & USFS managers on public lands, & dove tail with the Conservation Reserve Enhancement Program (CREP) to establish buffers in riparian areas increases cost effectiveness & accelerates restoration to meet biological goals.




Map 2: WRIA 32,
Upper Touchet Subbasin



Relationship to Other Projects:

Project #	Title/description	Nature of relationship
	Lower Snake River Compenstation Plan	Supplementation Assessment
19980200 0	Assess Fish Habitat & Salmonid in Walla Walla Watershed in Washington State	Touchet is a tributary to the Walla Walla
	Walla Walla Subbasin Summary	

Relationship to Existing Goals, Objectives and Strategies:

The Touchet River Watershed Program is based on the successful "Model Watershed" effort currently in place on the Tucannon River, a neighboring subbasin. Strategies used in the Touchet Program to restore habitat are found in the 1994 Fish and Wildlife Program (FWP), Section 7.7B "Model Watershed," and are compatible with the 2000 Columbia Basin Fish and Wildlife Program (Program) Habitat Strategies, WDFW Wild Salmonid Policy, Wy Kan Ush Me Wa Kish Wit, and the Walla Walla Subbasin Summary. Specifically they all refer to locally driven, collaborative developed watershed planning and implementation program designed to protect, enhance and restore habitat to support abundant salmonid populations.

Review Comments:

The $232,000 that is listed in Section 8 was identified as cost share when in fact it is supposed to be implementation. Reviewers suggest that more riparian work should be performed in the near future instead of instream activities. This project addresses habitat issues that are essential to the successful management of endangered species and has been proposed to be implemented in the appropriate areas. The proposal needs to be retooled to concentrate on passive restoration approaches (i.e.. fencing and planting) and the budget should be reduced appropriately. There is disagreement on the level of success of bioengineering solutions and the reviewers would like to see an emphasis on returning ecosystem function to the stream corridor. This project needs to be implemented consistent with limiting factors and problem locations identified in subbasin summaries and eventually subbasin planning to insure fisheries benefits to target species. There needs to be oversight by the COTR to insure that actions taken will benefit fish and wildlife. There is a disconnect between what are identified as limiting factors and the application of restoration measures.

Budget:

FY02	FY03	FY04
343,912 Category: High Priority (passive restoration measures only)	381,526 Category: High Priority (passive restoration measures only)	399,238 Category: High Priority (passive restoration measures only)

Research, Monitoring, and Evaluation Activities

While some BPA-funded monitoring projects began as early as 1986, most monitoring and evaluation activities took place after 1995. Most of the work has been associated with assessing stream habitat and the natural production of lamprey and salmonids. There are currently no BPA-funded hatchery programs that release smolts into the Walla Walla subbasin so there have not been any artificial production evaluations funded by BPA. Current monitoring and evaluation activities are critical to current and developing restoration activities and include the following:

- surveys to determine the current distribution, abundance and densities of lamprey and salmonids;
- habitat surveys to determine flows, temperature, channel morphology and riparian condition;
- a radio telemetry project to evaluate bull trout and steelhead passage at the irrigation diversions and other obstacles and to determine migration timing and spawning areas;
- spawning surveys to evaluate the spawning of adult hatchery chinook out-planted into natural production areas;
- the characterization of steelhead/rainbow genetics from populations from nine major tributaries/areas of the Walla Walla subbasin.

BPA-funded research, monitoring, and evaluation activities within the Walla Walla subbasin that are used to compliment fish and wildlife projects are provided in Table 36.

Table 36. BPA-funded Columbia River Basin Fish and Wildlife Program research, monitoring, and evaluation activities within the Walla Walla River subbasin. (Columbia Basin Fish and Wildlife Authority 1999; Pacific States Marine Fisheries Commission 2001; Bonneville Power Administration and Northwest Power Planning Council 1999; Glen Mendel, WDFW, personal communication, January 2001; Allen Childs, CTUIR, personal communication, February 2, 2001)

Project	BPA #	Sponsor	Duration
Restoration and research of Pacific lamprey	9402600	CTUIR	1995-1999
Monitor and evaluate wildlife mitigation projects in the Rainwater Wildlife Area	20082	CTUIR	2000-2005
Monitor and evaluate the natural production, distribution, abundance and genetics salmonids	20127	CTUIR	2000-2004
Watershed habitat and salmonid fish stock assessment in the WA portion of the Walla Walla subbasin	901100	WDFW	1999-2002
N. E. Oregon artificial production and supplementation planning	8805305	ODFW	1997-1999
Assess adult salmon and steelhead passage at the Walla Walla River mouth	9204101	USACE	1996
Determine status, life history, genetic, habitat needs, and limiting factors for bull trout in the South and North Fork Walla Walla, Mill and Pine Creeks	9405400	ODFW, OS Systems	1994-1997
Identify resident fish species population density and overlap by habitat type in the Wolf Fork and Mill Creek	9005300	WDFW	1991-1992
Model and gather data at the Dayton Pond to standardize fish health monitoring	8601300	WDFW	1986-1987, 1989
Survey the Walla Walla Pond as a potential site for possible hatchery or acclimation pond sites	8608200	USFWS	1986-1987, 1989
Monitor fish health in Dayton Pond	8601300	WDFW	1986-1987, 1989

Needed Future Actions

Fish and wildlife managers in the Walla Walla subbasin continue to seek solutions to resolve problems affecting the productivity, stability, and perpetuity of natural resources. The first step in accomplishing this task is to identify factors known to limit the productivity of the resource. Upon their definition, resource specialists are able to prescribe specific strategies or actions needed to rectify or adjust the factor.

Lead management agencies in the subbasin have a common goal of restoring and/or stabilizing native fish, wildlife and plant species. Given the condition and number of many areas of critical concern, however, the process will likely take an appreciable amount of time before noticeable gains are made. For instance, fisheries managers have identified the need to rectify flow and temperature problems in portions of the subbasin for years and have made considerable gains, although these factors continue to persist. Similarly, wildlife managers have continually recognized the need to improve habitat connectivity, reduce invasion of exotic species, and restore structural complexity of vegetation types, yet still recognize these problems to be among the greatest threats to species propagation.

Core refugia for plant and animal species in the Walla Walla exists, albeit at reduced levels from historic conditions. Conservation and expansion of these areas is a common need recognized by both fish and wildlife managers. Specific needs for fish and wildlife managers are discussed below.

Fish

Fish needs are summarized in Table 38.

Table 38. Fisheries resources management needs in the Walla Walla subbasin.

Needs	***Reference from this document***		***Other References***
	Limiting Factor	**Strategy/Action**	
Improve Streamflows	Table 25 App. D, J	• 4.4-4.8	USACE 1997; WDE 2000; USBR 1999; Mendel 1981, 1999; Van Cleve and Ting 1960; CTUIR & ODFW 1990; CBFWA 1999; Kuttel 2000; Hanson and Mitchell 1977; CRITFC 1996
Improve Stream Temperatures	Table 25 App. D, J	• 1.1-1.3 • 2.1-2.7	USACE 1977; Mendel et al. 2000; CTUIR & ODFW 1990; WWBWC 2000; WDOE 2000; Buchanan et al. 1997; Mendel and Taylor 1981; Mendel et al. 1999; Hunter and Crop 1975; Leigh and Phelps 1985; Mendel et al. 2001; Kuttel 2000; CBFWA 1999; CRITFC 1996
Address Passage Impediments	Table 25 App. D, J	• 5.2-5.8	PDMFC 2001; Hunter and Crop 1975; Ebasco Services & SP Cramer & Assoc. 1992; Zimmerman 1993; USACE 1997; OSGC 1963; CRITFC 1996; Legih & Phelps 1985; Mendel et al. 1995, 2000, 2001; Kuttel 2000; CBFWA 1999; CRITFC 1996

Needs	Reference from this document		Other References
	Limiting Factor	Strategy/Action	
Improve Riparian Habitats	Table 25 App. D, J	• 1.1-1.3 • 2.1-2.7 • 3.1-3.9	USACE 1977; Mudd 1975; Kuttel 2000; Northrop 1998a, 1998b; Cleveland et al. 1975; USFS & BLM 2000; CRITFC 1996; CBFWA 1999; CRITFC 1996
Improve Instream Habitat Quality and/or Diversity	Table 25 App. D, J	• 3.1-3.9	Kuttel 2000; Northrop 1998a, 1998b; WDNR 1998; CBFWA 1999; CRITFC 1996
Reduce Sediment Inputs	Table 25 App. D, J	• 1.1-1.3 • 2.2-2.8 • 3.1-3.9	USACE 1997; Leigh and Phelps 1985; Pacific Groundwater Group 1995; Mapes 1969; WDNR 1998; CBFWA 1999; CRITFC 1996
Protect Stronghold Habitats	Table 25 App. D, J	• 3.10	Buchanan et al. 1997 CBFWA 1999; CRITFC 1996
Law Enforcement for Protection of Fish and Wildlife and their habitats	Table 25	• 1.2-1.3 • 2.2 • 3.2 • 4.6 • 5.8 • 15.2	CRITFC 1996
Increase Adult Spawners (parental base)	Table 25 App. K	All strategy/actions listed above plus • 6.1-6.2 • 7.1-7.2 • 10.1-10.2	CRITFC 1996
Increase SARs (smolt-to-adult returns)	Table 25 App. K	• 10.1-10.2 • 15.1-15.2	CRITFC 1996
Address Research Monitoring &Evaluation and Data Gaps	Table 25	• 1.4-1.5 • 2.9 • 3.11 • 4.1-4.3 • 4.9 • 5.1 • 6.3 • 7.3	CBFWA 1999; CRITFC 1996

Needs	Reference from this document		Other References
	Limiting Factor	Strategy/Action	
		• 9.1-9.5 • 11.1-11.2 • 12.1-12.7 • 13.1-13.4 • 14.1-14.2 • 15.3	

Improve Stream Flows

Populations of salmonid fish in the Walla Walla subbasin have been severely impacted by low stream flows due to out-of-stream uses. These impacts have occurred for more than 100 years and continue today. Data collected in 1935-1936 and summarized by Van Cleve and Ting (1960) reported that "it would be practically impossible for spring chinook salmon to ascend the river under the present system of water use." As a result of these activities, spring chinook salmon indigenous to the Walla Walla River were driven to extinction. Today, summer steelhead, bull trout, and various other native aquatic species continue to endure these practices.

The Bi-State Policy Group as led by Washington State representative Dave Mastin identified the Walla Walla River at Tumalum, Mill Creek at Wilbur Avenue, Cottonwood Creek at Powerline Road, Dry Creek at Dixie, and the South Fork of the Touchet River mouth as in immediate need of improved streamflow. This list represents a best estimation of professional and local judgment. Appendix J includes observed flows at each of these locations in 2000 and goals for 2001. The Bi-State Policy Group is currently developing short-term solutions in these areas. Examples include lease of water rights, voluntary irrigation conservation, and use timing.

Imposing actions for the take of bull trout under the ESA prompted the Walla Walla, Hudson Bay, and Gardena Farms Irrigation Districts to sign an Interim Agreement with USFWS in 2000. This agreement among other things required the districts to leave a minimum flow of 13 cfs in the mainstem Walla Walla River past Nursery Bridge (including Tumalum) and 10 cfs past Burlingame Dam for the summer of 2000. These flows proved helpful although not sufficient to meet the needs of salmonids species in these reaches. The surface flow was ultimately lost subsurface and to evaporation in the area of Tumalum Bridge leaving a significant reach dewatered during the summer months. Further negotiations with the Districts are expected to occur in 2001. The flow needs in this section of the river for salmonids are not known yet, although it is felt that at least double the amount left in 2000 will be necessary.

In 1997, the USACE completed the Walla Walla River Watershed Reconnaissance Report. This comprehensive document explores long-term meaningful answers that meet the needs of both aquatic species and agriculture in the basin. Possible solutions resulting from this document include off-channel storage, Columbia River pumping directly to irrigation district head gates, conservation through improved delivery systems and purchase of water rights from willing sellers. At this time, further federal funding is needed to take these actions onto the feasibility stage.

Beyond the needs mentioned above, further actions necessary to meet flow requirements for salmonids in the basin include education, municipal, industrial, and farm conservation practices. Efforts to restore floodplain/riparian function and thus bank storage of water should continue. The WDE and OWRD must develop a clear understanding of all water users, time of use, and closely monitor and enforce water law. Whenever possible, water rights from willing sellers should be purchased. Where out-of-stream uses are causing low flow problems, attempts should be made to mitigate these problems. One possible solution is acquisition of water rights. Oregon's Instream Water Rights Law allows water right holders to donate, lease, or sell some or all of their water right for transfer to instream use.

Improve Stream Temperatures

Excessively high stream water temperatures are a basin-wide problem, as indicated by the number of streams listed for temperature on the 303(d) list (Table 5). Elevated water temperatures are a result of anthropogenic changes in the basin. Primary causes for elevation in stream temperature are loss of shade producing vegetation, reduced stream flows, reduced hyporheic flows, loss of effective floodplain function and changes in stream channel geomorphology. Primary short-term areas of need for salmonid restoration activities include the mainstem Umatilla from the confluence of Meacham Creek to the mouth (excluding the reach positively influenced by the inflow of cool water released from McKay Reservoir), Meacham Creek from the mouth to headwaters, and Birch Creek from the mouth to headwaters. Ongoing activities to restore riparian vegetation and improve stream channel and floodplain form and function should be continued. Efforts to improve streamflows through water exchanges and through lease or purchase of out-of-stream water rights for transfer to instream should be accelerated if possible.

Scientific investigation and characterization is needed to identify the location and effect of ground water input, tributary input, cold water habitat, and temperature profiles as they relate to cold-water refugia. These efforts will allow managers to target areas in need of mitigation and/or protection under state authority. The most effective methodology to rapidly produce this data over large geographical expanses is the Forward Looking Infrared Radiometry (FLIR) technology.

Address Passage Impediments

Adult and juvenile passage impediments are a primary reason for salmon extinction and depressed steelhead populations in the Walla Walla subbasin and, to an unknown extent, are affecting lamprey and bull trout populations. The U.S. Army Corps of Engineers (1997) identified 61 structures in the basin which provide some level of impediment for fish passage. Many more exist in smaller tributaries or were not identified in that report. These passage impediments are predominantly related to diversion structures, with the exception of Mill Creek where many impediments are associated with flood control structures. Mitigation of these impediments has just begun in recent years.

In the area of upstream passage, two decommissioned dams have been removed, the ladder at Burlingame Dam has been upgraded, and a new ladder is under construction at Nursery Bridge Dam. Other adult passage impediments have also been identified, most notably at Hofer Dam on the lower Touchet River and at a number of locations in Mill

Creek. An inventory of upstream passage impediments needs to be conducted, especially in the smaller tributary areas.

To improve downstream passage, new fish screen systems have been constructed on the mainstem at the two largest diversions in the basin. New or upgraded screens have also been installed at a number of smaller diversions, primarily in the Oregon portion of the basin. Two ditch consolidation/screening projects on the mainstem and a new screen system for the City of Walla Walla water supply intake on Mill Creek are in the planning stages. Most of the remaining gravity diversions in the basin have screens in disrepair, which do not meet current NMFS screening criteria, or are unscreened. Most of the larger diversions that fall into these categories have been identified for future improvements. However, many of the smaller diversions have not yet been identified for upgrades.

It is unknown as to what extent pump diversions have been screened in the basin. Efforts are currently underway to begin assessing the number of pump diversions and the screening situation. A comprehensive inventory of pump and gravity diversions in both the mainstem and tributaries needs to be conducted in order to assess future screening requirements.

Structural improvements at both ladder and screen sites is only one aspect of a successful passage program. If structures are not properly maintained or operated within established criteria, then limited or no passage benefits are expected from the improvements. Comprehensive operation and maintenance programs need to be implemented to meet these needs.

Improve Riparian Habitats

Riparian vegetation is a critical component of a stable, functioning stream ecosystem. Degradation of riparian vegetation communities leads to unraveling of both physical and biological processes. Riparian vegetation provides multiple benefits, including stream bank stability, stream channel shading, insect drop, organic matter for terrestrial and aquatic insects, thermal cover for wildlife, nesting and roosting areas for song birds, and recruitable instream wood. Mudd (1975) estimated that only 37% of the Touchet River riparian zone is currently vegetated. Along the Oregon portion of the Walla Walla River, 70% of the existing riparian zone is in poor condition (Water Resources Commission 1988, cited in U. S. Army Corps of Engineers 1997).

Activities to improve riparian habitat should continue, particularly at or upstream of reaches currently marginal for survival of salmonid fish. Riparian improvements in these areas may over time dramatically expand available rearing and ultimately elevate juvenile survival and outmigration. Stream buffers, whether implemented through voluntary long-term lease or farm programs, are urgently needed in cropland zones to meet the needs of both salmonid fish and Clean Water Act objectives. Livestock exclusion through fencing, off-channel watering, native revegetation, bioengineering, noxious weed control, and purchase of habitats critical to salmonid fish should continue. Fish managers should at all times continue landowner education and cooperation. County zoning laws must fully recognize and protect sensitive riparian habitats.

Improve Instream Habitat Diversity

Intensive land uses throughout the Walla Walla River subbasin have negatively effected watershed function, altered natural channel and floodplain form, and nearly eliminated most riparian zones. Many streams have been straightened resulting in channel degradation, incision, and loss in available rearing potential. Other outcomes have included streams losing their bank strength, over-widening and extending laterally. This has resulted in large, unstable gravel bars predominated by riffle habitat and elevating stream temperatures.

Contrary to popular belief, diverse stream channels are often the most stable during high flow events, acting as biological sponges of sediment and out-of-bank water. Stream meander increases stream length, elevating rearing capacity and slowing water velocities and resultant bank erosion and sediment input. Meander promotes bank storage of water leading to diverse and abundant growth of riparian vegetation. Large woody debris and organic material recruited from vegetated corridors provides holding areas for adult fish, concealment for juveniles, and a constant source of food for macroinvertebrates.

To meet the needs of salmonid fish, it is important to mimic riverine conditions known to be of high production value to these fishes. Whenever possible, floodplains free of constraint, fully vegetated riparian corridors, and stream meander are imperative. Landowner education and continued funding for farm programs such as the Conservation Reserve Enhancement Program are also necessary. Where naturally present, large woody debris should be encouraged. Channel forming stream flows should as close as possible follow natural flow regimes. Strict county zoning plans and enforcement are needed to halt all further expansion into the critically remaining riparian corridors.

Reduce Sediment Inputs

Many streams in the Walla Walla subbasin have excessively turbid waters and high percentages of fine sediment in spawning substrates. These conditions are notable in the lower Touchet, Lower Dry, and Pine creeks, all of which have several inches to several feet of sediment covering the channel bottom (G. Mendel, WDFW, personal communication, February 2001). The infrequent but intense localized rain storms, coupled with the character, mobility and exposure of native soils, results in high loads of sediment delivered to stream channels (G. Mendel, WDFW, personal communication, February, 2001). Because the storms are coincident with periods of low stream competence, the severity of impact is amplified (G. Mendel, WDFW, personal communication, February 2001).

In order to mitigate and restore channel conditions, managers must accurately identify potential and active sediment production areas, at a basin-wide level. Upon their location, managers need to take appropriate actions to address mitigation and restoration. Efforts should address both upland and lowland landscapes in order to identify source and delivery areas. Problem areas may be addressed by implementing BMPs as documented in the TMDL water quality management plans (Oregon Department of Environmental Quality et al. 2000; Washington Department of Ecology 1999). Initiation of a TMDL study in the Washington portion of the subbasin is warranted.

Protect Stronghold Habitats

Particular areas of the basin provide habitat and species strongholds. These areas are considered of highest quality habitat and paramount to the continuance of water quality and many species, particularly summer steelhead and bull trout. These areas are the life-blood of the basin and account for the majority of fish production. Should catastrophic events occur, these areas would likely be instrumental in maintaining a basin-wide population base. In Oregon, the upper North and South Forks of the Walla Walla River, and Mill Creek within the Mill Creek Watershed. On the Washington side, stronghold areas include the Wolf Fork above Robinson Creek and the North Fork of the Touchet above its confluence with the Wolf Fork (Glen Mendel, WDFW, personal communication). Current management and/or protective strategies that have allowed stronghold habitats to persist must be continued. Enforcement of state and federal laws needs to be increased for fish protection, habitat protection, and water quality/quantity protection. Above all else, stronghold habitats should be protected to maintain their current status. Habitat acquisition should be emphasized where opportunities exist to protect stronghold fish and wildlife habitats or to enhance areas to stronghold status.

Increase Adult Spawners

Endemic salmonid species currently documented to be limited by adult spawners in the Walla Walla subbasin are bull trout (Hanson et al. 2001) and summer steelhead. Recently reintroduced spring chinook are also limited by lack of adult spawners. Natural production of steelhead in both Oregon and Washington portions of the basin are at about 300 to 400 fish annually (Table 17 and Table 18). Historic populations were estimated to be about 4,000 to 5,000 (Chapman 1981). The multitude of human-caused impacts to Walla Walla steelhead populations through the years have not, on average, allowed natural production to replace itself. This is not unusual as most endemic salmon and steelhead populations in the mid- to upper-Columbia River system are experiencing similar trends. Even if replacement was occurring, current populations are not at levels that can meet natural production and harvest numeric objectives. Spring chinook, in initial stages of reintroduction (adult outplanting experiments), are not capable of meeting seeding levels. As a result, key needs for the Walla Walla steelhead and spring chinook restoration program is habitat enhancement (in and outside basin) and artificial production efforts to generate more adult spawners from which to build.

There are numerous strategies for increasing adult abundance of salmonid fish populations including improvements in total survival, reduction of sport and/or commercial harvest, artificial propagation and habitat and passage improvement. Current efforts to increase bull trout adult abundance are to prohibit sport harvest, improve habitat and passage and to improve survival of fish with a fluvial life history. These efforts should be continued and improvements made through monitoring and evaluation of the fluvial life history pattern. Steelhead abundance below objectives should be addressed through habitat improvement and hatchery supplementation with endemic Walla Walla stock (CTUIR). Spring chinook abundance below objectives should be addressed through habitat improvement and continued hatchery supplementation (adult outplanting) with the additional production proposed by CTUIR. Monitoring of adult return success and survival (for anadromous species) should be continued.

Increase Smolt to Adult Returns

Low smolt-to-adult returns (SARs) impede efforts to achieve natural production, broodstock, and harvest objectives in the Walla Walla subbasin due to both in and outside subbasin issues.

Inside subbasin issues relate to improved passage conditions (in-river flows, water quality, and management of smolt by-pass facilities) that will result in higher smolt survival. The Walla Walla River Fish Passage Operations Project should continue to oversee operation of fish by-pass facilities and monitor river conditions to optimize in-river conditions for smolt outmigration. Fish managers should support development and implementation of actions to achieve waste load allocation similar to that adopted by the Umatilla TMDL (Oregon Department of Environmental Quality et al. 2000) to improve water quality conditions for salmonids.

Outside subbasin issues relate to reducing the mortality of downstream migrants through the impounded Columbia River mainstem to meet production and harvest objectives. Specific emphasis is needed to address human-induced changes regarding fish passage, water quality, predation, and estuary conditions. These specifics are expected to be identified in mainstem subbasins as a part of the NWPPC's fish and wildlife restoration planning and implementation process. Without appropriate sharing of the conservation burden throughout the fish's life history, concentrated efforts in the subbasins will have limited results.

Address Research/Data Gaps

Natural Production

- Document primary and secondary steelhead spawning areas.
- Determine key migration routes, run timing and winter holding areas of fluvial bull trout.
- Evaluate juvenile salmonid outmigrant timing and survival. Identify and document problem reaches and factors.
- Evaluate success of out-planting spring chinook adult into spawning and rearing areas, monitor resulting progeny at the parr, smolt and adult life-history stages.
- Collect trend data for salmonid distribution, abundance, densities, and aging growth throughout the subbasin.
- Maintain archive of genetic material for steelhead and bull trout.
- Assess the effect of exotic fish species on resident and migratory salmonids.
- Increase monitoring and assessment of indigenous steelhead, bull trout, mountain whitefish and other species to determine abundance and population status:
    - Determine steelhead abundance in Mill Creek and bull trout run timing.
    - Increase bull trout monitoring to determine population abundance and distribution in the Touchet River system.
    - Increase spawner surveys to detect movements and reproductive isolation and distribution.
- Refine or determine appropriate adult steelhead and bull trout abundance for spawner escapement goals.

Artificial Production

- Assess the level of residualism from hatchery-reared steelhead from the subbasin.
- Assess the in-basin level of straying and spawning into natural steelhead production areas by non-endemic hatchery steelhead.
- Reconstruct/improve Touchet River trap in Dayton.
- Evaluate straying of reintroduced Walla Walla spring chinook into the Tucannon River.

Flows/Passage

- Determine passage success of adult steelhead and bull trout past irrigation diversions and other passage obstacles.
- Evaluate results of existing flow enhancement efforts and define most feasible options to meet additional needs.

Habitat

- Basin-wide inventory of all surface water diversions.
- Inventory salmonid habitat in the Oregon portion of the subbasin.
- Increase water quality monitoring within the subbasin.

Planning

- Develop a research/restoration plan for Pacific lamprey.
- Develop a research/restoration plan for shellfish.

Wildlife

Needs

Habitat

Grassland and Shrubsteppe

- Protect, maintain, and enhance shrubsteppe habitats.
- Improve connectivity between existing shrubsteppe fragments.
- Move savannah grassland with potential brooding, leking and wintering sharp-tailed grouse habitat into protect status.
- Enhance and restore native perennial grassland habitats.
- Reduce non-native annual grasses in shrubsteppe and grassland habitat.
- Pursue and implement effective biological controls on noxious weeds including yellow-star thistle and knapweeds.

Forest

- Protect, maintain, and enhance late-seral dry forest habitats.
- Maintain large patch size late-seral dry forest stands.
- Restore and maintain snag and downed wood densities of a variety of species to meet nesting and foraging requirements of forest dwelling landbirds.
- Move mid-elevation and foothill big game winter range habitat into protected status
- Protect, enhance, and restore aspen clones.
- Reduce road densities and associated impacts to watershed functions.

Riparian

- Control noxious weeds in specific high value habitat areas (i.e. reed canary grass in wetland and riparian communities).

- Restore riparian understory shrub communities.
- Maintain and improve large structure riparian cottonwood galleries for Lewis' woodpecker.
- Identify and protect remaining ferruginous hawk nest sites and associated habitats in the subbasin.

Wildlife Populations

- Restore anadromous fish populations to support dependent wildlife populations and promote natural nutrient cycling.
- Evaluate status of avian species that are inadequately surveyed by standardized survey protocols.
- Evaluate the importance of individual habitat fragments to native wildlife species on private lands in the subbasin.
- Assess methods to reduce cowbird parasitism on native bird species.
- Inventory herptile and small mammals and their habitats in the subbasin.
- Maintain, protect, and enhance big game winter range.
- Reduce bullfrog predation on juvenile western painted turtle and other native herptiles.
- Reduce domestic sheep/bighorn sheep conflicts in primary Rocky Mountain bighorn sheep habitat.
- Reintroduce Rocky Mountain bighorn sheep into suitable habitats.
- Reestablish harvestable populations of mountain quail.
- Assess impacts of ravens, cowbirds, crows, starlings, and magpies on species at risk.
- Assess the impacts of shed antler collecting on deer and elk herds and associated habitats.

Actions by Others

Table 33. Non BPA-funded fish and wildlife activities within the Walla Walla River subbasin. (Robert Gordon, Walla Walla City Water Division Manager, December 7, 2000; Tim Bailey, ODFW, personal communication, December 29, 2000; Glen Mendel, WDFW, personal communication, January 3, 2001; Northrop 1998b; Paul Ashley, WDFW, personal communication, February 2, 2001; Allen Childs, CTUIR, personal communication, February 2, 2001)

Project	Funding/Lead Agency	Duration
Passage Improvement		
Juvenile fish screens in the Oregon portion of the Walla Walla River	ODFW	2001
Fish passage and screening at the Walla Walla water intake on Mill Creek	OWEB, NMFS/ Walla Walla	2001
South Fork Walla Walla adult passage	OWEB, WWBWC, private	ongoing
North Fork Walla Walla adult passage	OWEB, WWBWC, private	ongoing
Adult passage on Stone Creek	WDFW, WWCD	complete
Adult passage on Mill Creek	WDOT/WWCD	complete
Fish passage and screening on Mill Creek	SRFB/WWCD	complete
Adult passage at the Touchet River pushup diversions	IAC/CCD	planning
Fish passage and screening at the Bennington Lake Intake on Mill Creek	SRFB, USACE/ WDFW, USACE	ongoing
Screen retrofitting throughout the Oregon portion of subbasin	Mitchell Act/ODFW	ongoing
Diversion inventory and screening in WA	SRFB/WDFW	ongoing
Adult passage on the South Fork Kibbler Creek	OWEB, CTUIR/WWBWC	planning
Adult passage on the South Fork Hopper Creek	OWEB, CTUIR/WWBWC	planning
Adult passage on the North Fork Sams Creek	OWEB, CTUIR/WWBWC	planning
Adult passage on the North Fork Walla Walla River	OWEB, CTUIR/WWBWC	planning
Adult passage on Bullock Creek	OWEB, CTUIR/WWBWC	planning
Adult passage at the Lewis Creek barrier	SRFB/CCD & WDFW	planning
Adult passage on the South Fork Robertson Creek	OWEB, CTUIR/WWBWC	planning

Adult passage at Garrison Creek	College Place, USACE	planning
Adult passage at the Gose Street Bridge on Mill Creek	USACE	planning
Adult passage at Carlson Creek	NRCS	planning
Adult passage at Whitman Mission on Doan Creek	NPS	planning
Fish passage and screening at the eastside Nursery Pump on the Walla Walla River	ODFW	planning
Adult passage at Fern and 9th Streets on Yellowhawk Creek	SRFB/WWCD	planning
Adult passage at Whiskey Creek Dam	SRFB/WDFW	ongoing
Adult passage at the small dams on Yellowhawk Creek	SRFB/WWCD	ongoing
Adult passage and riparian enhancement at Patit Creek	CCD/WDFW & private	ongoing
Headgate installation	OWRD, UC, NRCS, OWEB, WWBC	
Little Walla Walla diversion consolidation and conservation	USBR, WWID, HBIC, OWRD	
Screening on the lower Walla Walla River, Garrison Creek, and Mill Creek	USACE/Walla Walla County	
Adult passage at Dry Creek, OR at the Buroker Dam		
Adult passage at Pine Creek, OR at the Hudson Bay Canal Road		
Adult passage at Dry Creek, WA		
Adult passage at Reeser Creek Dam		
Adult passage at the Mud Creek culvert		
Adult passage at Pine Creek, WA		
Adult passage on Mill Creek		
Adult passage at the Yost Ditch on the Touchet River		
Adult passage at the Hern Ditch on the Touchet River		
Adult passage at Couse Creek		
Adult passage at Dry Creek, WA dams on Sapolil Road		
Fish passage and screening throughout the subbasin	WDFW	
Flow Enhancement		
Irrigation conservation to enhance stream flow	OWEB/WWBWC	
Water allocation	WDE, OWRD	
Stream flow enhancement throughout the subbasin	WDE, OR Water Trust, OWRD	
Filing for instream water rights for stream flow enhancement throughout the subbasin	ODFW	
Acquire water to address stream flow enhancement throughout the subbasin	OWRD	

Stream flow enhancement throughout the subbasin	WA Water Trust	
Water developments on Page Ridge, Maloney Mountain, and Eckler Mountain	USFS, WDFW, RMEF	
Habitat Enhancement		
Rainwater Wildlife Area watershed restoration	Washington State/CTUIR	1999-2000
Tussock moth mitigation	UNF, Walla Walla city	2000
Habitat enhancement	CCD, WWCCD	1997-ongoing
Couse Creek/Shumway riparian and instream restoration	ODFW, NRCS, Walla Walla Watershed Council, CTUIR	1996-2001
Wildlife enhancement for Mill Creek Reservoir area	USACE, WDG	1980
LSRCP mitigation	USACE, WDG	1979-1984
LSRCP wildlife mitigation	USACE, WDG	1977-ongoing
South Fork Walla Walla trail reconstruction	USFS	ongoing
Road maintenance	USFS	ongoing
Stream habitat enhancement throughout Columbia County	SRFB, various/CCD	ongoing
Upland enhancement via direct seeding	SRFB/CCD	ongoing
Stream enhancements across the subbasin	Milton-Freewater Water Control District/USACE	ongoing
Habitat enhancement on Patit Creek	SRFB/CTUIR	ongoing
Habitat enhancement on the South Fork Touchet	SRFB/CTUIR	ongoing
Habitat protection throughout the Walla Walla subbasin	CTUIR	ongoing
Stream habitat enhancement throughout the subbasin	Col. CD, WWCD/ODFW	ongoing
Fish and habitat management planning for Habitat Conservation Plan	Irrigation Districts	ongoing
Flood Control District planning for buffers	Prescott	ongoing
Habitat enhancement throughout subbasin	private	ongoing
Wallula Wetlands enhancement	USFWS	ongoing
Habitat enhancement on Stone Creek	Wal-Mart	ongoing
Upland Restoration Plantings	WDFW	ongoing
Habitat enhancement throughout the subbasin	WDE	ongoing
Stream habitat enhancement throughout the subbasin	WWCD	ongoing
Direct seeding	SRFB/WWCD	ongoing

Stream enhancements throughout the subbasin	Various/WWBWC	ongoing
Weed control projects	USFS, County Weed Boards	ongoing
Riparian habitat enhancement at Yellowhawk Creek	Private/WDFW	ongoing
Spray winter range to control noxious weeds	ODFW	ongoing
Mill Creek flood control project enhancements	USACE	planning
Garrison Creek habitat enhancement	USACE	planning
Stream restoration at the College Place sewage treatment plant on Garrison Creek	College Place, WWCD, WW County	planning
Habitat enhancement on lower Mill Creek	Tri-State Steelheaders	planning
Construct 206 setback levees on the Walla Walla River	Milton-Freewater Water Control District/USACE	planning
Fish and habitat management planning	USFWS, WDFW	
Mill/Titus Creek levee setback	USACE/Walla Walla County	
Miscellaneous work on Mill Creek	FEMA/Umatilla County	
Fish and habitat management planning	USFWS/WDFW	
Habitat enhancement planning	WDFW	
Weed control around Cottonwood Creek	Blue Mountain Elk Initiative, ODFW, Umatilla County/ODFW	
Road closure program on Griffin Peak and Chase Mountain areas	USFS	
Forage enhancement projects on Bennett Timber Company lands, Eckler Mountain, and the Rainwater Wildlife Area	RMEF, CTUIR	
Deer and elk habitat enhancement, and depredation prevention and mitigation on private land	ODFW	
Artificial Propagation		
Spring chinook salmon release	CTUIR, Walla Walla	2000
Trap adult steelhead on the Walla Walla River at Nursery Bridge Dam	ODFW, CTUIR	1992-1998
LSRCP steelhead mitigation and resident trout stocking	WDFW	1985-1999
Brown trout stocking	WDFW	1962-98
Develop local steelhead stock on the Touchet River	LSRCP/WDFW	ongoing

Management Coordination		
Settlement agreement with local irrigators	USFWS	2000
Flood hazard management planning	WDE/Walla Walla County	complete
Ski Bluewood road use permit	USFS	ongoing
Private land access	BLM	ongoing
North end sheep and goat grazing allotment	USFS	ongoing
South Fork Walla Walla River recreational use	BLM	ongoing
Tiger timber sale	USFS	ongoing
Bull trout recovery planning	Various/ODFW, USFWS	ongoing
Annual blue and ruffed grouse wing collection from hunters	ODFW	ongoing
Hunter check stations	ODFW, OSP	ongoing
Waitsburg Comprehensive Flood Plan covering the Touchet River and Coppei Creek	Waitsburg	Planning
Research Monitoring & Evaluation		
Limiting factors report draft required by WA state legislature to compile information about the WRIA	WCC	2000
Bull trout recovery plan draft	USFWS, ODFW	1999-2000
Mill Creek Master Plan report on flood control and enhancement for warm water fish	USACE	1995
Bull trout surveys in upper Mill Creek and North Fork Touchet River	USFS	1995-1998
Special report on blue grouse in NE OR	ODFW	1995
Habitat assessment surveys in forest lands on upper Mill Creek, Walla Walla and Touchet Rivers	USFS	1987
Collection of stream habitat and fish information for use in the HSI model and IFIM work	USACE, USFWS, WDG	1981
Identify and collect natural resource data in the Walla Walla River watershed	CTUIR, CCCD, CEEd	1998-2000
Touchet water quality studies	CCCD/CEEd	ongoing
Assess project impact	FEMA/Walla Walla County	ongoing
Annual blue and ruffed grouse sex, age, and hatch date analysis	ODFW	ongoing
Annual harvest reports for pronghorn, bear, cougar, deer, elk, waterfowl, and upland game birds	ODFW	ongoing
Annual inventory of trend and production data for upland game birds, deer, and elk	ODFW	ongoing
Mount Emily elk herd delineation wildlife research report	ODFW	ongoing

Annual mule deer fall herd composition counts	ODFW	ongoing
Annual mule deer and elk spring composition counts	ODFW	ongoing
Annual brood counts	ODFW	ongoing
Winter raptor surveys	ODFW	ongoing
Mill Creek flood control project operations and maintenance	USACE	planning
Population modeling for both mule deer and elk populations	ODFW	
Watershed assessment report	Various/CTUIR, CEEd	
Upriver monitoring	OWRD	
Monitor and evaluate groundwater	Walla Walla College	
Limiting factors assessment	WCC	
Pre/Post project assessments	CCCD/WDFW	
Monitoring and evaluation	Whitman College	
Walk the Stream program	WWCD	
Student monitoring	WWCD	
Water quality assessment	OWEB/WWBWC	
Watershed assessment	Various, CCCD	
Continuous temperature monitoring	ODEQ	
Water quality chemistry	ODEQ	
Morphologic surveys	ODEQ	
Infrared remote sensing	ODEQ	
GIS studies	ODEQ	
Stream simulations leading to temperature prediction	ODEQ	
Develop relationships between upland and bank erosion and instream turbidity and suspended solids	ODEQ	
Write plans in winter range, grassland, and shrubsteppe areas to establish native habitats for either deer and elk winter range or sharp-tailed grouse habitat needs	ODFW, NRCS	
Irrigation diversion inventory	OWRD, UC, NRCS, OWEB, WWBC	

Appendix A - Points of diversion for the Oregon portion of the Walla Walla subbasin

Location	**Number of Diversions**
Couse Creek	10
North Fork Walla Walla	13
South Fork Walla Walla	21
Mainstem Walla Walla (below forks)	11
Pine Creek (incl. Schwartz and Dry Cr.)	36
Little Walla Walla River	120
West Prong Walla Walla	18
East Prong Walla Walla	30
East Mud Creek	11
South Mud Creek	11

(T. Justus, OWRD, February 2001)

Appendix B - Wildlife species occurring within the Walla Walla subbasin

(generated using ICBEMP species range maps and verified by local biologists)

Amphibians	
Ambystoma macrodactylum	Long-toed Salamander
Ambystoma tigrinum	Tiger Salamander
Ascaphus truei	Tailed Frog
Bufo boreas	Western Boreal Toad
Bufo woodhousii	Woodhouse's Toad
Pseudacris regilla	Pacific Chorus Frog
Rana catesbeiana	Bullfrog
Rana luteiventris	Spotted Frog
Rana pipiens	Northern Leopard Frog
Spea intermontana	Great Basin Spadefoot
Birds	
Accipiter cooperii	Cooper's Hawk
Accipiter gentilis	Northern Goshawk
Accipiter striatus	Sharp-shinned Hawk
Actitis macularia	Spotted Sandpiper
Aechmophorus occidentalis	Western Grebe
Aegolius acadicus	Northern Saw-whet Owl
Aegolius funereus	Boreal Owl
Aeronautes saxatalis	White-throated Swift
Agelaius phoeniceus	Red-winged Blackbird
Agelaius tricolor	Tricolored Blackbird
Aix sponsa	Wood Duck
Alectoris chukar	Chukar
Ammodramus savannarum	Grasshopper Sparrow
Anas acuta	Northern Pintail
Anas americana	American Wigeon
Anas clypeata	Northern Shoveler
Anas crecca	Green-winged Teal
Anas cyanoptera	Cinnamon Teal
Anas discors	Blue-winged Teal
Anas platyrhynchos	Mallard
Anas strepera	Gadwall
Anthus rubescens	American Pipit
Aquila chrysaetos	Golden Eagle
Archilochus alexandri	Black-chinned Hummingbird
Ardea herodias	Great Blue Heron
Asio flammeus	Short-eared Owl

Asio otus	Long-eared Owl
Athene cunicularia	Burrowing Owl
Aythya affinis	Lesser Scaup
Aythya americana	Redhead
Aythya collaris	Ring-necked Duck
Aythya valisineria	Canvasback
Bombycilla cedrorum	Cedar Waxwing
Bombycilla garrulus	Bohemian Waxwing
Bonasa umbellus	Ruffed Grouse
Botaurus lentiginosus	American Bittern
Branta canadensis	Canada Goose
Bubo virginianus	Great Horned Owl
Bucephala albeola	Bufflehead
Bucephala clangula	Common Goldeneye
Bucephala islandica	Barrow's Goldeneye
Buteo jamaicensis	Red-tailed Hawk
Buteo lagopus	Rough-legged Hawk
Buteo regalis	Ferruginous Hawk
Buteo swainsoni	Swainson's Hawk
Calcarius lapponicus	Lapland Longspur
Calidris alba	Sanderling
Calidris alpina	Dunlin
Calidris bairdii	Baird's Sandpiper
Calidris canutus	Red Knot
Calidris himantopus	Stilt Sandpiper
Calidris mauri	Western Sandpiper
Calidris melanotos	Pectoral Sandpiper
Calidris minutilla	Least Sandpiper
Calidris pusilla	Semipalmated Sandpiper
Callipepla californica	California Quail
Carduelis flammea	Common Redpoll
Carduelis hornemanni	Hoary Redpoll
Carduelis pinus	Pine Siskin
Carduelis tristis	American Goldfinch
Carpodacus cassinii	Cassin's Finch
Carpodacus mexicanus	House Finch
Casmerodius albus	Great Egret
Cathartes aura	Turkey Vulture
Catharus fuscescens	Veery
Catharus guttatus	Hermit Thrush
Catharus ustulatus	Swainson's Thrush
Catherpes mexicanus	Canyon Wren
Certhia americana	Brown Creeper
Ceryle alcyon	Belted Kingfisher
Chaetura vauxi	Vaux's Swift

Charadrius semipalmatus	Semipalmated Plover
Charadrius vociferus	Killdeer
Chen caerulescens	Snow Goose
Chlidonias niger	Black Tern
Chondestes grammacus	Lark Sparrow
Chordeiles minor	Common Nighthawk
Cinclus mexicanus	American Dipper
Circus cyaneus	Northern Harrier
Cistothorus palustris	Marsh Wren
Clangula hyemalis	Oldsquaw
Coccothraustes vespertinus	Evening Grosbeak
Coccyzus americanus	Yellow-billed Cuckoo
Colaptes auratus	Northern Flicker
Colinus virginianus	Northern Bobwhite
Columba livia	Rock Dove
Contopus borealis	Olive-sided Flycatcher
Contopus sordidulus	Western Wood-pewee
Corvus brachyrhynchos	American Crow
Corvus corax	Common Raven
Cyanocitta cristata	Blue Jay
Cyanocitta stelleri	Steller's Jay
Cygnus columbianus	Tundra Swan
Dendragapus obscurus	Blue Grouse
Dendroica coronata	Yellow-rumped Warbler
Dendroica petechia	Yellow Warbler
Dendroica townsendi	Townsend's Warbler
Dryocopus pileatus	Pileated Woodpecker
Dumetella carolinensis	Gray Catbird
Empidonax hammondii	Hammond's Flycatcher
Empidonax oberholseri	Dusky Flycatcher
Empidonax occidentalis	Cordilleran Flycatcher
Empidonax traillii	Willow Flycatcher
Eremophila alpestris	Horned Lark
Euphagus carolinus	Rusty Blackbird
Euphagus cyanocephalus	Brewer's Blackbird
Falco columbarius	Merlin
Falco mexicanus	Prairie Falcon
Falco peregrinus	Peregrine Falcon
Falco sparverius	American Kestrel
Fulica americana	American Coot
Gallinago gallinago	Common Snipe
Geothlypis trichas	Common Yellowthroat
Glaucidium gnoma	Northern Pygmy-owl
Haliaeetus leucocephalus	Bald Eagle
Himantopus mexicanus	Black-necked Stilt

Hirundo pyrrhonota	Cliff Swallow
Hirundo rustica	Barn Swallow
Histrionicus histrionicus	Harlequin Duck
Icteria virens	Yellow-breasted Chat
Icterus galbula	Northern Oriole
Ixoreus naevius	Varied Thrush
Junco hyemalis	Dark-eyed Junco
Lanius excubitor	Northern Shrike
Lanius ludovicianus	Loggerhead Shrike
Larus argentatus	Herring Gull
Larus californicus	California Gull
Larus canus	Mew Gull
Larus delawarensis	Ring-billed Gull
Larus glaucescens	Glaucous-winged Gull
Larus hyperboreus	Glaucous Gull
Larus philadelphia	Bonaparte’s Gull
Larus pipixcan	Franklin’s Gull
Leucosticte arctoa	Rosy Finch
Leucosticte tephrocotis	Gray-crowned Rosy Finch
Limnodromus griseus	Short-billed Dowitcher
Limnodromus scolopaceus	Long-billed Dowitcher
Limosa fedoa	Marbled Godwit
Lophodytes cucullatus	Hooded Merganser
Loxia curvirostra	Red Crossbill
Loxia leucoptera	White-winged Crossbill
Meleagris gallopavo	Wild Turkey
Melospiza lincolnii	Lincoln’s Sparrow
Melospiza melodia	Song Sparrow
Mergus merganser	Common Merganser
Mimus polyglottos	Northern Mockingbird
Mniotilta varia	Black-and-white Warbler
Molothrus ater	Brown-headed Cowbird
Myadestes townsendi	Townsend’s Solitaire
Nucifraga columbiana	Clark’s Nutcracker
Numenius americanus	Long-billed Curlew
Nycticorax nycticorax	Black-crowned Night Heron
Oporornis tolmiei	Macgillivray’s Warbler
Oreoscoptes montanus	Sage Thrasher
Otus flammeolus	Flammulated Owl
Otus kennicottii	Western Screech Owl
Oxyura jamaicensis	Ruddy Duck
Oxyura jamaicensis	Ruddy Duck
Pandion haliaetus	Osprey
Parus atricapillus	Black-capped Chickadee
Parus gambeli	Mountain Chickadee

Parus rufescens	Chestnut-backed Chickadee
Passer domesticus	House Sparrow
Passerculus sandwichensis	Savannah Sparrow
Passerella iliaca	Fox Sparrow
Passerina amoena	Lazuli Bunting
Perdix perdix	Gray Partridge
Perisoreus canadensis	Gray Jay
Phalacrocorax auritus	Double-crested Cormorant
Phalaenoptilus nuttallii	Common Poorwill
Phalaropus lobatus	Red-necked Phalarope
Phalaropus tricolor	Wilson'S Phalarope
Phasianus colchicus	Ring-necked Pheasant
Pheucticus melanocephalus	Black-headed Grosbeak
Pica pica	Black-billed Magpie
Picoides albolarvatus	White-headed Woodpecker
Picoides arcticus	Black-backed Woodpecker
Picoides pubescens	Downy Woodpecker
Picoides tridactylus	Three-toed Woodpecker
Picoides villosus	Hairy Woodpecker
Pinicola enucleator	Pine Grosbeak
Pipilio erythrophthalmus	Rufous-sided Towhee
Pipilo chlorurus	Green-tailed Towhee
Piranga ludoviciana	Western Tanager
Plectrophenax nivalis	Snow Bunting
Pluvialis squatarola	Black-bellied Plover
Podiceps auritus	Horned Grebe
Podiceps nigricollis	Eared Grebe
Podilymbus podiceps	Pied-billed Grebe
Pooecetes gramineus	Vesper Sparrow
Porzana carolina	Sora
Quiscalus quiscula	Common Grackle
Rallus limicola	Virginia Rail
Recurvirostra americana	American Avocet
Regulus calendula	Ruby-crowned Kinglet
Regulus satrapa	Golden-crowned Kinglet
Riparia riparia	Bank Swallow
Salpinctes obsoletus	Rock Wren
Sayornis saya	Say's Phoebe
Selasphorus rufus	Rufous Hummingbird
Setophaga ruticilla	American Redstart
Sialia currucoides	Mountain Bluebird
Sialia mexicana	Western Bluebird
Sitta canadensis	Red-breasted Nuthatch
Sitta carolinensis	White-breasted Nuthatch
Sitta pygmaea	Pygmy Nuthatch

Sphyrapicus nuchalis	Red-naped Sapsucker
Sphyrapicus thyroideus	Williamson's Sapsucker
Spizella arborea	American Tree Sparrow
Spizella passerina	Chipping Sparrow
Stelgidopteryx serripennis	Northern Rough-winged Swallow
Stellula calliope	Calliope Hummingbird
Sterna caspia	Caspian Tern
Sterna forsteri	Forster's Tern
Sterna hirundo	Common Tern
Strix nebulosa	Great Gray Owl
Strix varia	Barred Owl
Sturnella neglecta	Western Meadowlark
Sturnus vulgaris	European Starling
Tachycineta bicolor	Tree Swallow
Tachycineta thalassina	Violet-green Swallow
Thryomanes bewickii	Bewick's Wren
Tringa flavipes	Lesser Yellowlegs
Tringa melanoleuca	Greater Yellowlegs
Tringa solitaria	Solitary Sandpiper
Troglodytes aedon	House Wren
Troglodytes troglodytes	Winter Wren
Turdus migratorius	American Robin
Tyrannus tyrannus	Eastern Kingbird
Tyrannus verticalis	Western Kingbird
Tyto alba	Common Barn Owl
Vermivora celata	Orange-crowned Warbler
Vermivora peregrina	Tennessee Warbler
Vermivora ruficapilla	Nashville Warbler
Vireo gilvus	Warbling Vireo
Vireo olivaceus	Red-eyed Vireo
Vireo solitarius	Solitary Vireo
Wilsonia pusilla	Wilson's Warbler
Xanthocephalus xanthocephalus	Yellow-headed Blackbird
Zenaida macroura	Mourning Dove
Zonotrichia albicollis	White-throated Sparrow
Zonotrichia atricapilla	Golden-crowned Sparrow
Zonotrichia leucophrys	White-crowned Sparrow
Zonotrichia querula	Harris' Sparrow
Mammals	
Antrozous pallidus	Pallid Bat
Canis latrans	Coyote
Castor canadensis	Beaver
Cervus elaphus nelsonii	Rocky Mountain Elk
Clethrionomys gapperi	Southern Red-backed Vole
Didelphis virginiana	Virginia Opossum

Dipodomys ordii	Ord’s Kangaroo Rat
Eptesicus fuscus	Big Brown Bat
Erethizon dorsatum	Common Porcupine
Euderma maculatum	Spotted Bat
Felis concolor	Mountain Lion
Glaucomys sabrinus	Northern Flying Squirrel
Gulo gulo	Wolverine
Lasionycteris noctivagans	Silver-haired Bat
Lasiurus cinereus	Hoary Bat
Lemmiscus curtatus	Sagebrush Vole
Lepus americanus	Snowshoe Hare
Lepus californicus	Black-tailed Jackrabbit
Lepus townsendii	White-tailed Jackrabbit
Lutra canadensis	Northern River Otter
Lynx canadensis	Lynx
Lynx rufus	Bobcat
Marmota flaviventris	Yellow-bellied Marmot
Martes americana	American Marten
Mephitis mephitis	Striped Skunk
Microtus longicaudus	Long-tailed Vole
Microtus montanus	Montane Vole
Microtus richardsoni	Water Vole
Mustela erminea	Ermine
Mustela frenata	Long-tailed Weasel
Mustela vison	Mink
Myotis californicus	California Myotis
Myotis ciliolabrum	Western Small-footed Myotis
Myotis evotis	Long-eared Myotis
Myotis lucifugus	Little Brown Myotis
Myotis thysanodes	Fringed Myotis
Myotis volans	Long-legged Myotis
Myotis yumanensis	Yuma Myotis
Neotoma cinerea	Bushy-tailed Woodrat
Odocoileus hemionus	Mule Deer
Odocoileus virginianus	White-tailed Deer
Ondatra zibethicus	Common Muskrat
Onychomys leucogaster	Northern Grasshopper Mouse
Perognathus parvus	Great Basin Pocket Mouse
Peromyscus maniculatus	Deer Mouse
Phenacomys intermedius	Heather Vole
Pipistrellus hesperus	Western Pipistrelle
Plecotus townsendii pallescens	Pale Western Big-eared Bat
Procyon lotor	Common Raccoon
Reithrodontomys megalotis	Western Harvest Mouse
Scapanus orarius	Coast Mole

Sorex merriami	Merriam's Shrew
Sorex preblei	Preble's Shrew
Sorex vagrans	Vagrant Shrew
Spermophilus beldingi	Belding's Ground Squirrel
Spermophilus columbianus	Columbian Ground Squirrel
Spermophilus lateralis	Golden-mantled Ground Squirrel
Spermophilus townsendii	Townsend's Ground Squirrel
Spermophilus washingtoni	Washington Ground Squirrel
Spilogale gracilis	Western Spotted Skunk
Sylvilagus floridanus	Eastern Cottontail
Sylvilagus nuttallii	Mountain Cottontail
Tamias amoenus	Yellow-pine Chipmunk
Tamias minimus	Least Chipmunk
Tamiasciurus hudsonicus	Red Squirrel
Taxidea taxus	American Badger
Thomomys talpoides	Northern Pocket Gopher
Ursus americanus	Black Bear
Vulpes vulpes	Red Fox
Zapus princeps	Western Jumping Mouse
Reptiles	
Charina bottae	Rubber Boa
Chrysemys picta	Painted Turtle
Coluber constrictor	Racer
Crotalus viridis	Western Rattlesnake
Diadophis punctatus	Ringneck Snake
Eumeces skiltonianus	Western Skink
Hypsiglena torquata	Night Snake
Masticophis taeniatus	Striped Whipsnake
Phrynosoma douglassii	Short-horned Lizard
Pituophis catenifer	Gopher Snake
Sceloporus graciosus	Sagebrush Lizard
Sceloporus occidentalis	Western Fence Lizard
Thamnophis elegans	Western Terrestrial Garter Snake
Thamnophis sirtalis	Common Garter Snake
Utah stansburiana	Side-blotched Lizard

Appendix C - Reaches identified in Salmonid Habitat Limiting Factors Water Resource Inventory Area (WRIA) 32, Walla Walla Watershed (Kuttel 2000)

Reach	Description
Lower Walla Walla Mainstem 1	State line to Mill Creek, including Little Walla Walla River
Lower Walla Walla Mainstem 2	Mill Creek to McDonald Road
Lower Walla Walla Mainstem 3	McDonald Road to mouth
Pine Creek	Headwaters to state line
Pine and Mud Creeks	State line to mouth
Dry Creek	Headwaters to Hwy. 12 bridge near Sapolil Road
Dry Creek	Hwy. 12 bridge near Sapolil Road to mouth
Lower Mill Creek	Mill Creek Dam to mouth
Yellowhawk and Garrison Creeks	Headwaters to mouth
Cottonwood, Russell, and Reser Creeks	Headwaters to mouth
Lower Touchet Mainstem 1	Lewis and Clark Trail State Park to Coppei Creek, including tributaries
Lower Touchet Mainstem 2	Coppei Creek to Hwy. 125 bridge, including tributaries
Coppei Creek	Coppei confluence to headwaters
Lower Touchet Mainstem 3	Hwy. 125 bridge to Walla Walla River, including tributaries
Upper Mill Creek	Headwaters to Mill Creek Dam
North Fork Touchet River 1	Headwaters to Lewis Creek, including tributaries
North Fork Touchet River 2	Lewis Creek to Wolf Fork, including tributaries
North Fork Touchet/Touchet River	Wolf Fork to Lewis and Clark Trail State Park, including tributaries
Wolf Fork Touchet	Headwaters to mouth, including tributaries, excluding Robinson Fork
Robinson Fork Touchet	Headwaters to mouth, including tributaries
South Fork Touchet River	Griffen Fork to mouth, including tributaries
Griffen, Burnt, and Green Forks Touchet River	Headwaters to mouth, including tributaries to each stream

Appendix D - Salmonid habitat rating criteria used during summer 2000 watershed resource inventories in the Walla Walla subbasin (Kuttel 2000)

Habitat Factor	Parameter/Unit	Poor (not properly functioning)	Fair (at risk)	Good (properly functioning)	Source
Riparian Condition	Riparian corridors, wetlands, intermittent headwater streams, and other areas where proper ecological functioning is crucial to maintenance of the stream's water sediment, woody debris, and nutrient delivery systems	Riparian areas are fragmented, poorly connected, or provide inadequate protection of habitats for sensitive aquatic species (<70% intact, refugia does not occur), and do not adequately buffer land use impacts; percent similarity of riparian vegetation to the potential natural community composition is <25%	Moderate loss of connectivity or function (shade, LWD recruitment, etc.) of riparian areas, or incomplete protection of habitats and refugia for sensitive aquatic species (≈ 70-80% intact) and inadequately buffer land use impacts; percent similarity of riparian to the potential natural community/ composition is ≥25-50%	Riparian areas provide adequate shade, LWD recruitment, and habitat protection and connectivity in subwatersheds, and buffers or includes known refugia for sensitive aquatic species (>80% intact) and adequately buffer land use impacts; percent similarity of riparian vegetation to the potential natural community/composition is >50%.	USFWS Guidelines; Technical Assessment Group (TAG) 2000, cited in Kuttel 2000
Streambank Condition	% of stream reach in stable natural condition.	<50% of any stream reach has ≥90% natural stability.	50-80% of any stream reach has ≥90% natural stability.	>80% of any stream reach has ≥90% natural stability.	USFWS Guidelines; TAG 2000
Floodplain Connectivity	Stream and off-channel habitat length with lost floodplain connectivity due to incision, roads, dikes, or flood protection structures.	Severe reduction in hydrologic connectivity between off-channel, wetland, floodplain and riparian areas; wetlands extent drastically reduced and riparian vegetation/succession altered significantly	Reduced linkage of wetland, floodplains and riparian areas to main channel; overbank flows are reduced relative to historic frequency, as evidenced by moderate degradation of wetland function and riparian	Off-channel areas are frequently hydrologically linked to main channel; overbank flows occur and maintain wetland functions, riparian vegetation and succession.	USFWS Guidelines

Habitat Factor	Parameter/Unit	Poor (not properly functioning)	Fair (at risk)	Good (properly functioning)	Source
			vegetation/succession.		
Width/Depth Ratio	Bankfull width/average bankfull depth	≥20	11-20	≤10	USFWS Guidelines; TAG 2000
Substrate Embeddedness	Degree of substrate embeddedness in spawning and rearing areas	>30%	20-30%	<20%	USFWS Guidelines; TAG 2000
Large Woody Debris	Pieces/mile that are >12" in diameter and >35' in length or stable at flows <25 year event; also adequate sources of woody debris are available for both long and short-term recruitment within the channel migration zone (CMZ)	Current levels are not at those desired values for "Good/Properly Functioning", and potential sources of woody debris for short and/or long-term recruitment are lacking within the CMZ	Current values are being maintained at minimum levels desired for "Good/ Functioning Appropriately", but potential sources for long-term woody debris recruitment are lacking within the channel migration zone to maintain these minimum values	Current values are being maintained at greater than 20 pieces/mile, >12" diameter and >35' in length or stable at flows >25 year event; also adequate sources of woody debris are available for both long- and short-term recruitment within the CMZ	USFWS Guidelines; TAG 2000
Pool Frequency (Pool/riffle ratio)	% wetted channel surface area comprising pools	<20% surface area	20-40% surface area	>40% surface area	TAG 2000
Pool Quality	Majority of pools	<1' deep or little or no cover and lack of interstitial spaces	1-3' with some cover and some interstitial spaces	>3' deep and or with sufficient surface or subsurface cover	TAG 2000
Off-channel habitat	Area within CMZ	Reach has no ponds, oxbows, backwaters, or other off-channel areas	Reach has <5 ponds, oxbows, backwaters, and other off-channel areas with cover per mile; but side-channel areas are generally	Reach has >5 ponds, oxbows, backwaters, and other off-channel areas with cover per mile; and side-channels are low energy areas.	USFWS Guidelines; TAG 2000

Habitat Factor	Parameter/Unit	Poor (not properly functioning)	Fair (at risk)	Good (properly functioning)	Source
			high energy areas.		
Temperature	°C/°F	>15.6°C/60°F (spawning) or >21.1°C/ 70°F (migration and rearing), or for bull trout, 7-day average maximum temperature in a reach during the following life history stages: • >15°C/59°F (rearing) • <39°F or >50°F (spawning) • <1°C or >6°C (incubation) also temperatures in areas used by adults during migration regularly exceed 15°C (59°F) (thermal barriers present)	14-15.6°C/ 59-60°F (spawning) or 18.3-21.1°C/65-70°F (migration and rearing), or for bull trout, 7-day average maximum temperature in a reach during the following life history stages: • <4°C or >13-15°C/<39°F or >55°-59°F (rearing) • <4°C or >10°C/ <39°F or 50°F (spawning) • <2°C or >6°C/36°F or 43°F (incubation) also temperatures in areas used by adults during migration sometimes exceed 15°C (59°F)	10-14°C/50-59°F (spawning) or <21.1°C/65°F (migration and rearing), or for bull trout, 7-day avg. maximum temperature in a reach during the following life history stages: • 4°-12°C/ 39°-54°F (rearing) • 4° -9°C/ 39° -48°F (spawning) • 2° -5°C/ 36° -41°F (incubation) also temperatures do not exceed 15°C (59°F) in areas used by adults during migration (no thermal barriers)	NMFS and USFWS Guidelines; TAG 2000
Dewatering	Presence/absence in a stream reach	No flows during some portion of the year or inadequate for all life stages	Inadequate flows for some life stages during some portions of the year	Adequate flows for all life stages present year-round	TAG 2000
Biological Processes	Lack of nutrient input from spawners, exotic species, etc.	No anadromous carcasses and there is likely exotic species interaction	Few anadromous carcasses or there is exotic species interaction	Many anadromous carcasses and no exotic species	TAG 2000

Appendix E - WRIA 32 salmonid habitat ratings (Kuttel 2000)

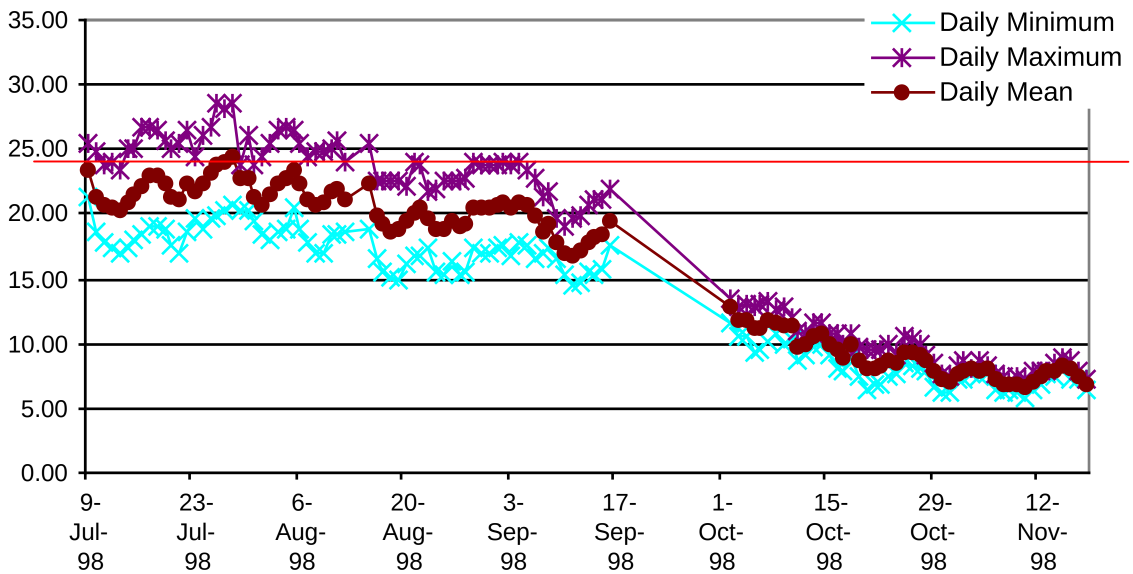
Stream Name	Fish Passage	Screens Diversions	Riparian	Bank Cond.	Floodplain Connectivity	Width Depth	Substrate Embed	LWD	Pool Freq.	Pool Qual.	Off-channel Habitat	Temperature	Dewatering	Biological Processes
Upper Touchet subbasin														
NF Touchet: Source to Lewis Creek		DG	F1-G1	F1	F2	F1-P1	F1	G1	P1	P1	F1	G1-F1	G2	F2
NF Touchet: Lewis Creek to Wolf Fork	G2	P2	F1-G1	P1-F1	F2	P1	DG	P1	P1	F1	F2	DG	G2	F2
NF Touchet: Wolf Fork to L/C Trail State Park		P2	F2	F1	P1	P1	G2	P2	P1	P1-F1	P2	P1	G2	F2
Wolf Fork		DG	P1-F1	P1	F2	P1	P1	P1	P1-F1	F1-G1	P1	DG	G2	F2
Robinson Fork		G2	P1	P2	DG	DG	DG	P1-F1	P1-F1	P1-F1	P1	DG	P2	F2
SF Touchet: Griffen Fork to mouth	G2	P2	P1	P1	P1	P1	P1	P1	P1	P1	P1	F1	P2	F2
SF Touchet: Griffen, Burnt, Green Forks	G2	G2	P1	P2	N/A	DG	DG	P1	P1	DG	N/A	DG	G2	F2
Lower Touchet subbasin														
Touchet: L/C Trail State Park to Coppei Creek	G1	DG	F1	F1	P1	DG	G2	P1	F1	F2	P2	P1	P2	P1
Touchet: Coppei Creek to Hwy. 125	G2	DG	F1	F1	P1	DG	P2	F1	F1	F1		P1		P1
Coppei Creek			F1	G1	F1	DG	F2	P1	P1	DG	P1	P1	P1	F2
Touchet: Hwy 125 to mouth	P1	DG	P2	DG		DG	P2	P2	DG	F2	P2	P1	P1	P1

Stream Name	Fish Passage	Screens Diversions	Riparian	Bank Cond.	Floodplain Connectivity	Width Depth	Substrate Embed	LWD	Pool Freq.	Pool Qual.	Off-channel Habitat	Temperature	Dewatering	Biological Processes
Lower Walla Walla subbasin														
Walla Walla: Stateline to Mill Creek	F2	DG	F2			DG	P2	P2	DG	DG	P2	P1	P1	F2
Walla Walla: Mill Creek to McDonald Road	F2	P2	DG	F2		DG	F2	F2	F1	F1	DG	P1	F2	P1
Walla Walla: McDonald Road to mouth	F2	DG				DG	P2	P2	F2	P2	DG	P1	P1	P1
Pine and Mud Creeks	G2	DG	P2	P1		DG	P2	DG	DG	DG	DG	P1	P2	F2
Dry Creek: Source to Hwy. 12 at Sapolil Road	F2?	DG	F2	G1		DG	DG	P1	F1	F1	DG	F1	P2	F2
Dry Creek: Hwy. 12 at Sapolil Road to mouth	F2	DG	P2	P1		F2	P2	P2	DG	DG	P2	P1	P2	F2
Mill Creek: Bennington Lake Dam to mouth	P1	DG	P1	P1		P2	P2	P2	P2	P2	P1	P1	P1	P1
Garrison Creek	P2	DG	P2	P2		G2	P2	P2	DG	DG	P2	P1	P2	F2
Yellowhawk Creek	F2	DG				P2	G2	P2	P2	F1	P2	P2		F2
Cottonwood, Russel, & Reser Creeks	P2	DG	DG	DG		DG	DG	DG	DG	DG	DG	P1	P2	F2
Upper Mill Creek Subbasin														
Mill Creek Source to Bennington Lake Dam	G2	P2	G1-F1	F1	F2	DG	DG	P1	P1	F1	F1	F1	DG	F2

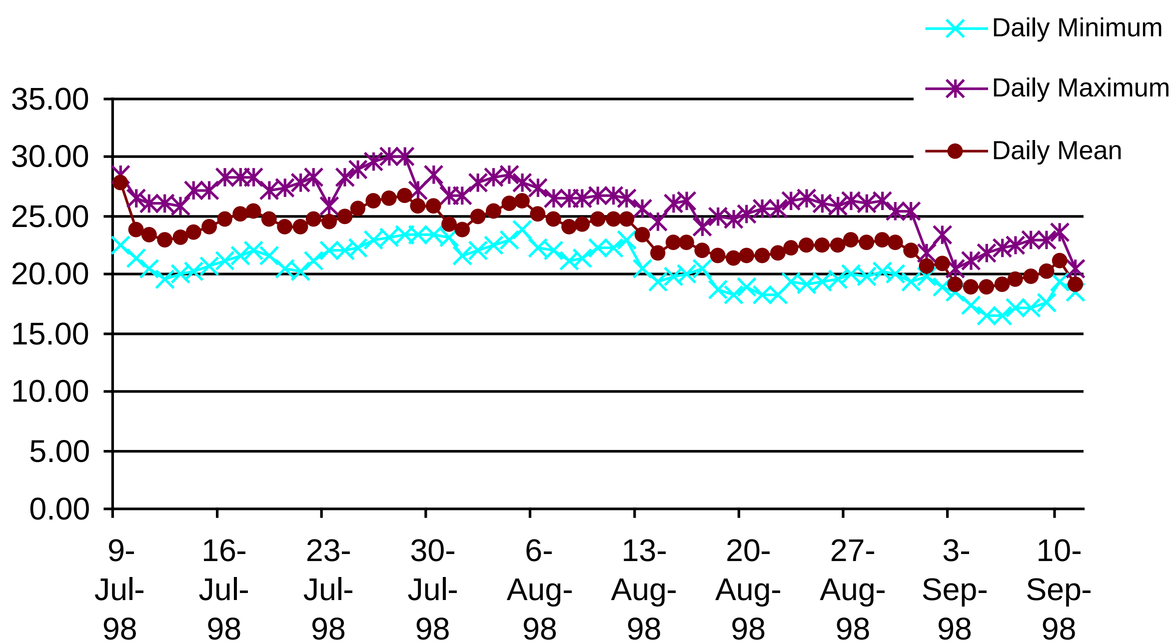
Stream Name	Fish Passage	Screens Diversions	Riparian	Bank Cond.	Floodplain Connectivity	Width Depth	Substrate Embed	LWD	Pool Freq.	Pool Qual.	Off-channel Habitat	Temperature	Dewatering	Biological Processes
Upper Walla Walla Subbasin														
Walla Walla River (Milton-Freewater to Stateline)	N/E	N/E	N/E	N/E	N/E	N/E	N/E	N/E	N/E	N/E	N/E	N/E	P1	N/E

P = Average habitat condition considered poor (Not Properly Functioning)
F = Average habitat condition considered fair (At Risk)
G = Average habitat condition considered good (Properly Functioning)
1 = Quantitative studies or published reports documenting habitat condition
2 = Professional knowledge of the WRIA 32 technical advisory group (TAG) members
S = Suspected
DG = Data Gap: habitat on the stream or reach has not been evaluated; TAG members had little or no knowledge of habitat conditions. The parameter was not rated.
NB = Natural Barrier
NAT = Natural
N/A= Not Applicable
N/E = Not Evaluated

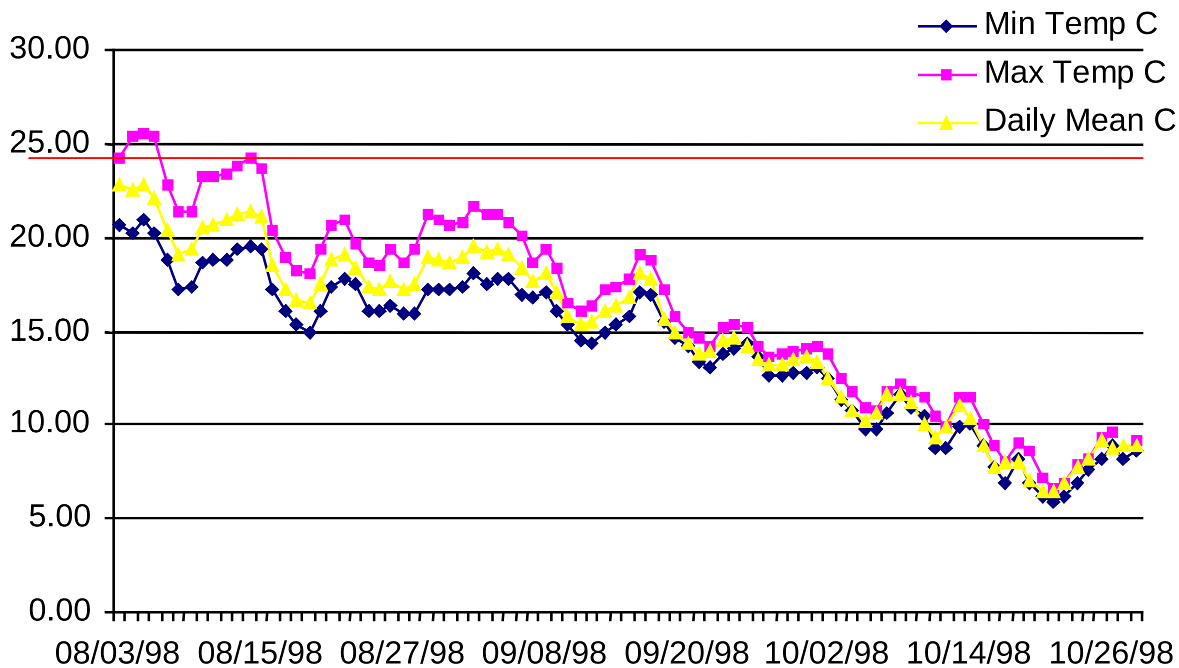
Appendix F - Summary of 1998 daily temperature values for the continuous instream monitor at Beet Road, Walla Walla River (Mendel et al. 1999)



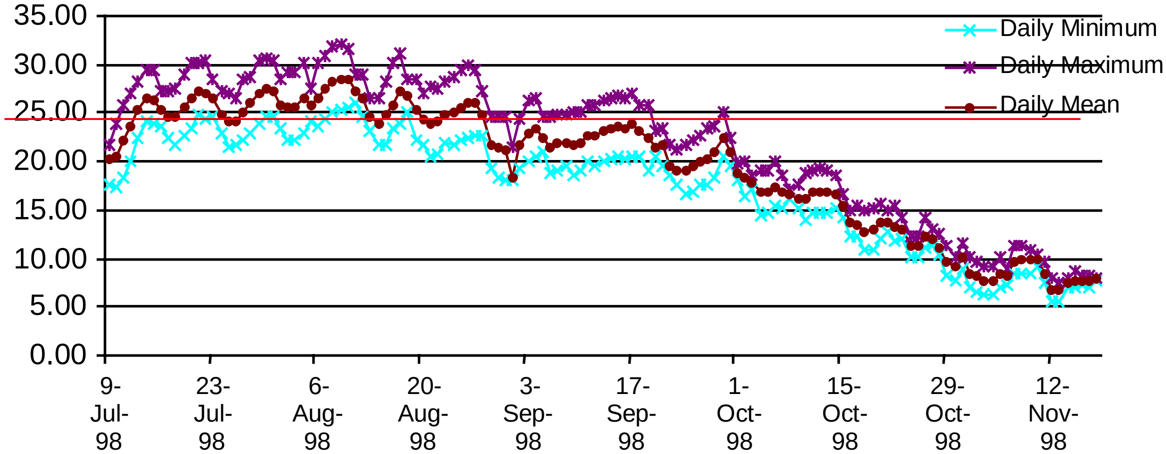
Appendix G - Summary of 1998 daily temperature values for the continuous instream monitor at McDonald Road, Walla Walla River (Mendel et al. 1999)



Appendix H - Summary of 1998 daily temperature values for the continuous instream monitor at Lower Coppei Creek, Touchet River (Mendel et al. 1999)



Appendix I - Summary of 1998 daily temperature values for the continuous instream monitor at Simms Road, Touchet River (Mendel et al. 1999)



Appendix J - Natural and anthropogenic factors that limit the production of salmonids and lamprey in the Walla Walla subbasin

Limiting Factor	Geomorphic Management Unit (as defined in Figure 23)
Unsuitable Flows (including low flow passage barriers)	Basinwide (general)
	Lower Touchet
	Middle Touchet
	Upper Touchet
	Walla Walla
	Dry Creek
	Lower Walla Walla
	Mid Walla Walla
	Upper Walla Walla
	Pine
	Mill
Unsuitable Stream Temperatures	Generic
	Lower Touchet
	Middle Touchet
	Upper Touchet
	Walla Walla
	Lower Walla Walla
	Middle Walla Walla
	Upper Walla Walla
	Pine Creek
	Mill Creek
Thermal Passage Barriers	Lower Touchet
	Middle Touchet
	Walla Walla
	Lower Walla Walla
	Middle Walla Walla
	Upper Walla Walla
	Pine
	Mill
Unsuitable Water Quality (Chemical)	Middle Touchet
	Walla Walla
	Lower Walla Walla
	Middle Walla Walla
	Mill Creek
Structural Passage Barriers (including entrainment and screening)	Oregon (general)
	Washington (general)
	Upper Touchet
	Lower Touchet
(Structural Passage Barriers – cont.)	Walla Walla

Limiting Factor	Geomorphic Management Unit (as defined in Figure 23)
	Middle Walla Walla
	Mill Creek
Unsuitable Instream Habitat Quality and/or Diversity	Washington (general)
	Lower Touchet
	Middle Touchet
	Upper Touchet
	Walla Walla
	Dry Creek – Sed.
	Lower Walla Walla
	Middle Walla Walla
	Mill Creek
Unsuitable Riparian Condition	Walla Walla subbasin (general)
	Upper Touchet
	Middle Touchet
	Lower Touchet
	Walla Walla
	Middle Walla Walla
	Pine Creek
	Mill Creek
Exotic Species Competition	Touchet
Out of Basin Pressures Contributing to Poor Returns	OR
	WA
Data Gaps	Generic

Appendix K - Hatchery and Genetic Management Plan (HGMP)

Hatchery Program:	Touchet River Endemic Summer Steelhead Stock Program: Lyons Ferry Complex – Lyons Ferry Hatchery
Species or Hatchery Stock:	Touchet River Summer Steelhead
Agency/Operator:	Washington Department of Fish and Wildlife
Watershed and Region:	Touchet River / Walla Walla River / Mid-Columbia Basin, Washington State
Date Submitted:	January 19, 2001
Date Last Updated:	January 19, 2001

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Hatchery: Lyons Ferry Complex.
Program: Touchet River Endemic Summer Steelhead Broodstock Program

1.2) Species and population (or stock) under propagation, and ESA status.

Summer Steelhead *(O. Mykiss),* Touchet River (Mid-Columbia ESU, Threatened)
Summer Steelhead (*O. Mykiss*), Lyons Ferry Stock (not-listed)

Both of the above stocks are currently produced at Lyons Ferry Complex. The proposed plan will slowly phase out Lyons Ferry Hatchery (LFH) stock from the Touchet River, once the new Touchet River endemic stock is developed and been proven successful.

1.3) Responsible organization and individuals

Hatchery Evaluations Staff Lead Contact
Name (and title): Joe Bumgarner, Steelhead Evaluation Biologist

Agency or Tribe: Washington Dept. of Fish and Wildlife
Address: 401 South Cottonwood, Dayton, WA 99328
Telephone: (509)-382-4755, or 382-1004
Fax: (509) 382-2427
Email: bumgajdb@dfw.wa.gov

Hatchery Operations Staff Lead Contact
Name (and title): Harold (Butch) Harty, Lyons Ferry Complex Manager
Agency or Tribe: Washington Dept. of Fish and Wildlife
Address: PO Box 278, Starbuck, WA 99359
Telephone: (509) 646-3454
Fax: (509) 646-3400
Email: hartyhrh@dfw.wa.gov

Fish Management Staff Lead Contact
Name (and title): Glen Mendel, District Fish Biologist
Agency or Tribe: Washington Dept. of Fish and Wildlife
Address: 529 W. Main, Dayton, WA 99328
Telephone: (509)-382-1005, or 382-1010
Fax: (509) 382-1267
Email: mendegwm@dfw.wa.gov

Other agencies, tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:

Confederated Tribes of the Umatilla Indian Reservation – co-manager

1.4) Funding source, staffing level, and annual hatchery program operational costs.

The Lower Snake River Compensation Plan (LSRCP – US Fish and Wildlife Service) presently funds production of mitigation fish (LFH stock summer steelhead established as a result of hydroelectric projects in the Snake River) that are released in the Touchet and Walla Walla rivers. The LSRCP program is committed to funding actions that are responsive to ESA needs for listed Columbia River steelhead affected by LSRCP hatchery actions. While the Touchet and Walla Walla rivers empty into the Columbia River, and are not part of the Snake River, they were included as part of the mitigation responsibilities for LSRCP. During the formation of the LSRCP, the managers believed that smolt survival might not be as high as proposed, and as some insurance, off-site mitigation was proposed. To provide for this additional loss, and without exceeding the limits of the available habitat from Snake River tributaries, the management agencies at the time chose the Touchet and Walla Walla rivers as suitable outlets for the required mitigation, as they were geographically located near the Snake River. Currently, steelhead management for mitigation in the Walla Walla river basin is mandated to provide 900 returning adult steelhead to the Walla Walla River, and 750 adult steelhead to the Touchet River.

While both Operational and Evaluation costs are presently covered by LSRCP funding, additional funding will likely be required to fully develop the Touchet River endemic summer steelhead broodstock program. For example, the current adult trap on the Touchet River in the city of Dayton is largely ineffective due to design (primary function is an intake water supply for the Dayton Acclimation Pond), and will likely limit the progress of the program in the future unless major modifications can be made to the existing structure, or a completely separate adult trap can be constructed.

1.5) Location(s) of hatchery and associated facilities.

Lyons Ferry Hatchery – along Snake River in Franklin County, Washington (RM 58)

Current Adult Trap – RM 53.3 on the Touchet River (WRIA 32), City of Dayton, Columbia County, Washington

Dayton Acclimation Pond – RM 53 on the Touchet River (WRIA 32), City of Dayton, Columbia County, Washington

1.6) Type of program.

Integrated Harvest

1.7) Purpose (Goal) of program (based on priority).

Mitigation: Continue to provide mitigation as specified under the LSRCP program while meeting conservation and recovery criteria established for the Touchet River population and Mid-Columbia River ESU. Provide harvest opportunities established under *US v Oregon* for tribal and recreational fisheries.

Conservation: Contribute to the population of naturally reproducing Touchet River summer steelhead that produce viable progeny, and which contribute to the conservation and recovery of the Touchet River population and Mid-Columbia River ESU.

1.8) Justification for the program.

The endemic population of summer steelhead in the Touchet River has remained relatively stable, though depressed, since 1984. Regardless, the summer steelhead population was listed as threatened under the ESA as part of the Mid-Columbia River ESU (March 25, 1999; FR 64 No. 57: 14517-14528). The LSRCP program has been operated since 1983 to provide mitigation for adult steelhead lost because of construction of the four lower Snake River dams. The current hatchery program has used LFH stock since the late 1980s (Schuck et al 1998), with releases in both the Walla Walla and Touchet rivers (see explanation above as to why LFH stock steelhead are released in the Touchet and Walla Walla rivers). The LFH stock was derived from fish trapped at the Snake River dams, and does not likely represent individuals that came from the Touchet or Walla Walla systems. The April 2, 1999, Biological Opinion issued by NMFS on the LSRCP-produced hatchery steelhead considered that the continued use of non-endemic steelhead stocks (such as the LFH stock) in the Mid-Columbia jeopardized the continued existence and chance for recovery of natural steelhead populations within the Columbia River.

Actions described within this HGMP represent the development and assessment of an endemic broodstock for Touchet River summer steelhead. Assessment is a crucial first activity in a series of actions that may eventually constitute a re-direction of LSRCP mitigation, by reducing and/or replacing releases of LFH stock steelhead in the Touchet River and other basins. This is considered necessary to align the LSRCP mitigation program with recovery requirements of the ESA. That, coupled with the desire of WDFW to recover depressed Mid-Columbia natural steelhead stocks, has prompted these proposed new hatchery actions.

Development of a hatchery stock based on endemic steelhead from the Touchet River for mitigation production may not increase natural productivity, but will serve several purposes. Primarily, the program as designed within this HGMP will continue to provide harvest mitigation under LSRCP while complying with NMFS's Reasonable and Prudent Actions as listed in their Biological Opinion. Washington Department of Fish and Wildlife desires to maintain healthy, abundant populations of steelhead within the Columbia River, but also wants to provide abundant fishery opportunities as provided for under the LSRCP mitigation program.

As secondary benefits, this program will attempt to maintain or increase numbers of naturally-reproducing Touchet River steelhead. This will be accomplished because Touchet River endemic stock returning adults will be allowed to spawn naturally. This will help conserve and/or rebuild the existing natural population to a healthy status. The program will also minimize the potential for genetic introgression and depression that may occur with continued use of the existing LFH stock. Interbreeding between LFH stock steelhead and natural steelhead may be reducing productivity and fitness within the natural population. Lastly, this program may also reduce straying of Touchet River steelhead. Lyons Ferry stock steelhead released into the Touchet have been shown to stray into other Columbia and Snake River basin rivers (Schuck et 1999). While this program will produce hatchery-reared fish, straying may be reduced because the new hatchery stock will be developed from the endemic population, which may stray to a lesser extent. However, WDFW realizes that straying of LFH stock from past Touchet River releases could be environmentally related (i.e. low river flows and high water temperature which restrict returning passage), and regardless of the stock used, straying into other basins may still occur.

1.9) List of program "Performance Standards."

(From NMFS *Artificial Propagation Performance Standards and Indicators,* October 24, 2000 Draft)

3.1 Legal mandates
3.2 Harvest
3.3 Conservation of naturally-spawning populations
3.4 Life History Characteristics
3.5 Genetic Characteristics
3.6 Research Activities
3.7 Operation of Artificial Production Facilities

1.10) List of program "Performance Indicators," designated by "benefits" and "risks."

1.10.1) "Performance Indicators" addressing benefits.

(From NMFS *Artificial Propagation Performance Standards and Indicators*, October 24, 2000 Draft: numbers specific to that document)

3.1.2 Program contributes to mitigation requirements.
- *Number of fish returning as applicable to mitigation requirements.*

3.2.1 Fish are produced and released in a manner enabling effective harvest.
- *Number of target fish caught by fishery*
- *Number of non-target fish caught by fishery*

- *Angler days by fishery*
- *Escapement of target fish*

3.2.2 Release groups sufficiently marked to assess impacts.
- *Marking rate by type in each group*
- *Sampling rate by fishery*
- *Number of marks by type documented by fishery.*

3.3.1 Program contributes to an increasing number of spawners returning to natural spawning areas.
- *Number of spawners on spawning ground and at hatchery by age.*
- *Number of redds in production index areas.*
- *Spawner-recruit ratios.*

3.3.2 Juvenile releases are sufficiently marked for evaluation.
- *Mark rates by type*
- *Mark recoveries for juveniles and adult returns.*

Use the above information to determine whether the population has declined, remained stable, or has been recovered to sustainable levels. The ability to estimate hatchery and natural proportions will be determined by implementation plans, budgets, and assessment priorities.

1.10.2) "Performance Indicators" addressing risks.

(From NMFS *Artificial Propagation Performance Standards and Indicators*, October 24, 2000 Draft : numbers specific to that document)

3.4.1 Fish collected for broodstock are taken throughout the return in proportions to the run distribution.
- *Timing of broodstock collection is documented and compared to entire return.*
- *Age composition of broodstock is documented though scale collection of entire run at adult trap.*

3.4.2 Broodstock collection does not reduce potential juvenile production in natural areas.
- *Broodstock collection and passage numbers are documented, and juvenile production will be documented on a yearly basis. Collection of broodstock will be adjusted (if possible) according to run size.*

3.4.3 Life history characteristics of artificially produced population do not diverge from natural population.
- *Life history characteristics of natural and endemic hatchery population are measured (age composition of smolts, smolt timing, size at smolting, smolt to adult return, adult sex ratio, age of adult return, fecundity, length/weight at age of return, temporal and spatial spawning distribution of returning adults).*

3.4.4 Annual release numbers do not exceed local, basin and migratory corridor capacities.

- *Annual release numbers of both LFH and endemic stock and their release locations and times documented.*
- *Natural production (juveniles and smolts) documented.*
- *Annual release numbers of juveniles and release locations.*

3.5.1 Patterns of genetic variation with natural populations do not change appreciably.

- *Genetic composition of naturally and artificially propagated adults is monitored and compared each generation (endemic stock only).*

3.5.2 Broodstock collection does not adversely affect the genetic diversity of the naturally spawning population.

- *Spawning escapement and composition documented.*
- *Timing of brood collection is documented.*

3.5.3 Artificially produced adults do not exceed appropriate proportion within the naturally spawning population.

- *Observed and estimated numbers of natural and endemic hatchery adults passing traps will be documented*

3.5.4 Juveniles are released on-station, or after sufficient acclimation to maximize homing ability to intended return locations.

- *Time, type and locations of hatchery releases are documented*

3.5.5 Fully smolted juveniles are released from hatchery program.

- *Level of smoltification at release is documented.*
- *Size at release of fry plants is documented.*

3.6.1 Artificial production program uses standard scientific procedures to evaluate aspects of the program.

- *Scientifically based experimental design, with measurable objectives and hypotheses.*

3.6.2 The program is monitored and evaluated on an appropriate schedule and scale to address progress toward achieving objectives.

- *Monitoring and evaluation framework includes timelines.*
- *Annual and final reports are produced.*

3.7.1 Artificial production facilities are operated in compliance with all applicable operational and fish health standards and protocols.

- *Compliance with operational and fish health standards and protocols is documented in annual reports.*

3.7.2 Effluent from facilities will not detrimentally affect natural populations.

- *Discharge water complies with applicable water quality standards, and in this case is outside the basin where the natural population exists (except for acclimation time).*

3.7.3 Water withdrawls will not prevent access to spawning areas, affect spawning behavior of natural populations, or significantly impact juvenile rearing environment.

- *Water withdrawls are documented and for this program are out of target species basin, except for acclimation time at release*
- *NMFS Screening criteria is documented*
- *Adult passage at diversion point is documented.*

3.7.4 Releases do not result in introduction of pathogens into natural production areas.
- *Proposed releases will be Fish-Health-certified prior to release.*

3.7.5 Carcass distribution for nutrient enhancement is in compliance with appropriate regulations.
- *Carcass and/or kelt distribution is documented for the target stream*
- *Compliance is documented*

3.7.6 Broodstock collection does not significantly impede passage or alter spatial/temporal distribution of natural population.
- *Temporal/spatial distribution of population around traps is documented.*

3.7.7 Weirs/traps do not result in significant stress/injury/mortality to natural population.
- *Mortality rates in traps are documented.*
- *Visual observations of fish delay periodically made.*

3.7.8 Predation by artificially-produced fish does not significantly reduce natural population.
- *Release information is documented and compared to natural population data.*
- *Majority of releases will occur downstream of juvenile rearing habitat.*

1.11) Expected size of program.

1.11.1) Proposed annual broodstock collection level (maximum number of adult fish).

The current program level is to collect 36 natural-origin fish annually (18 females, 18 males) through 2004 as the program is being evaluated.

Should the endemic broodstock program be successful, and NMFS makes a determination about harvest issues regarding the endemic stock returning adults, and decides that all LFH stock releases should be discontinued, WDFW is proposing the following:

Collect 88 fish annually (44 females, 44 males) all of Touchet River endemic stock (may consist of either natural or hatchery-origin). The percentage of each will be determined at a later date with agreement among the co-managers and NMFS. Increasing the broodstock will take many years of development (see Section 1.14).

No LFH stock steelhead will be collected in the Touchet River for hatchery propagation in this program. All LFH stock are currently trapped at LFH on the Snake River.

1.11.2) Proposed annual fish release levels (maximum number) by life stage and location.

For the first five years of juvenile/smolt releases into the Touchet River as the program is being developed and evaluated, the goal will be to produce 50,000 smolts that will be released into the upper watershed. Because survival in the hatchery of the endemic population is unknowns, up to 75,000 smolts may be released. If greater than 75,000 smolts would be released, then WDFW is proposing that up to 25,000 fingerlings could be released into the upper Touchet River basin in the fall before normal migration. In addition to that, 100,000 LFH stock smolts will continue to be released into the Touchet River from Dayton Acclimation Pond as part of the regular LSRCP mitigation production (Table 1).

After five years, the endemic stock program will be evaluated and decisions will be made between the co-managers and NMFS as to future production goals. Assuming the endemic program is successful, and NMFS makes a final determination that any level of LFH stock production constitutes jeopardy, then the only steelhead of Touchet River endemic stock would be released (See Section 1.14 for decision timelines).

If such a decision is reached, WDFW proposes the following smolt release numbers (Table 2). The primary hatchery production goal for the endemic program in the long-term would release a maximum of 150,000 smolts (all or a combination of acclimated and direct stream release combined) into the Touchet River at or above the city of Dayton. As mentioned above, greater survival may occur in the hatchery and more smolts could be produced than currently anticipated. To ensure that all fish that were removed from the river for broodstock have the chance to contribute to the population, excess juvenile steelhead will be identified in October of the year prior to release and released into the Touchet River as fingerlings.

Table 1. Short term summer steelhead production from Lyons Ferry Complex destined for the Touchet River. Represents initial releases of summer steelhead into the Touchet River as the endemic program is started (approximately 5 years)

Life Stage	Release Location (release method)	Stock	Production Goal	Maximum Annual Release Level
Eyed Eggs			0	0
Unfed Fry			0	0
Fry			0	0
Fingerling	Touchet River above RM 53 (direct)	Endemic	0	25,000
Yearling	Touchet River above RM 53 (direct)	Endemic	50,000	75,000
Yearling	Touchet River at RM 53 (acclimated)	LFH	100,000	100,000

Table 2. Proposed Long -term summer steelhead production from Lyons Ferry Complex destined for the Touchet River. Represents releases of summer steelhead into the Touchet River after full production of the endemic program has been reached. (This assumes that LFH stock was determined to cause jeopardy by NMFS at any release level and that harvest will be allowed on endemic hatchery stock adults when they return)				
Life Stage	**Release Location (release method)**	**Stock**	**Production Goal**	**Maximum Annual Release Level**
Eyed Eggs			0	0
Unfed Fry			0	0
Fry			0	0
Fingerling	Touchet River above RM 53 (direct)	Endemic	0	25,000
Yearling	Touchet River above RM 53 (direct)	Endemic	0	Up to 50,000
Yearling	Touchet River at RM 53 (acclimated)	Endemic	150,000	Up to 150,000

1.12) Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

The Touchet River endemic hatchery broodstock is a new program and has no pre-existing performance data within the hatchery. Smolt to adult return rates (SAR) for several recent release years of LFH stock steelhead into the Touchet and Walla Walla rivers have been documented (Table 3).

Estimated natural escapement into the Touchet River based on redd counts appears to be at replacement in many run years (see Table 5), contributing to the relatively stable population trend. Recent and historical performance of hatchery-reared steelhead in the Touchet River (LFH stock) has shown the program capable of returning adults far above the replacement line in all years (Table 3). We expects survival of the endemic brood hatchery-reared fish to equal or exceed the SAR's documented for the LFH stock. Early rearing survivals (egg-to- pre-smolt) within the hatchery are expected to exceed those observed in the Touchet River natural population. Should the stock switch occur in the future, many of the fish produced from the endemic brood will be allowed to spawn in the wild and contribute to filling available habitat and increasing the number of naturally-produced fish spawning in the wild one generation later. However, the main focus will be on mitigation harvest. Spawner-to-smolt survival within the hatchery is expected to increase because of the broodstock and hatchery program, but spawner-to-spawner survival of subsequent natural populations will be dependent upon ocean conditions, and improvements in basin productivity and migratory corridor survival.

Table 3. Smolt-to-adult survival rates from LFH stock summer steelhead released into the Touchet River from Dayton Acclimation Pond, or direct stream releases into the lower Walla Walla River (1988-1995).				
	Touchet R. Releases		Walla Walla Releases	
Release Year	SAR to LSRCP area (%)	SAR to Columbia R. (%)	SAR to LSRCP area (%)	SAR to Columbia R. (%)
1988	0.92	1.48	NA	NA
1989	0.95	1.27	NA	NA
1990	0.51	1.04	NA	NA
1991	1.60	2.13	NA	NA
1992	0.79	0.97	NA	NA
1993	1.43	1.87	0.83	1.28
1994	NA	NA	1.45	1.95
1995	2.36	2.57	1.99	2.26

1.13) Date program started (years in operation), or is expected to start.

The program started in February 2000, with 2000 brood year fish collected from the Dayton trap and spawned at LFH. The endemic program has been in operation for less than 1 year.

1.14) Expected duration of program.

The first priority of this hatchery endemic broodstock program as proposed by WDFW is for eventual continued mitigation under the LSCRP. Unknowns about the endemic program success have made us take a cautious approach in phasing out the current steelhead hatchery stock (LFH) used in the basin. WDFW is therefore proposing that the endemic program be operated for five years at a low production level (release of 50,000 smolts) where it can be evaluated against pre-determined expectations. Releases of LFH stock (100,000 smolts) will continue in the basin without a production decrease for the same time period. Over the next five years, WDFW will evaluate both in- and out- of hatchery performance to determine if the endemic program should be increased/continued in the future to provide mitigation. After the initial five years of the program, WDFW and the co-managers will decide on production levels for both endemic and LFH stock releases into the Touchet River. In the meantime NMFS will have to determine at what production level the LFH stock constitutes jeopardy to listed populations in the Touchet River and Mid-Columbia, and also make a ruling about the harvest of listed adult steelhead produced from endemic stock hatchery programs such as proposed in this HGMP.

Should the endemic stock produce adults as expected, and NMFS determines that any continued release of LFH stock in the Touchet constitutes jeopardy to listed fish, WDFW proposes the following (Table 4) to show the potential change in hatchery production within the Touchet River.

It is expected that conservation and recovery actions described within this program will continue until productivity within the basin has improved to a level where summer steelhead populations can accurately be determined to be at or above the replacement level most years (presumably a requirement which must be met for NMFS to de-list the population).

Table 4. Proposed broodstock collection and smolt production of the Touchet River summer steelhead endemic stock program.

Brood Year	Endemic Broodstock Collection	Endemic Smolts Released	LFH Stock Smolt Released
2000	18 Pairs	50,000	100,000
2001	18 Pairs	50,000	100,000
2002	18 Pairs	50,000	100,000
2003	18 Pairs	50,000	100,000
2004	18 Pairs	50,000	100,000
WDFW will examine all aspects of endemic stock program, and provide recommendations to co-managers and NMFS about continued production of the endemic stock and LFH stock within the Touchet River. Assuming Endemic stock is successful, the phase out of the LFH program could be as follows.			
2005	25	78,000	75000
2006	25	78,000	75,000
All 2005 and 2006 fish collected for broodstock would be natural origin			
2007	32	100,000	50,000
2008	32	100,000	50,000
Up to 25% of the fish collected in 2007 and 2008 for broodstock could be of hatchery-reared endemic stock origin.			
2009	40	150,000	None
2010	40	150,000	None
Up to 35% of the fish collected in 2009 and 2010 for broodstock could be of endemic stock origin.			

1.15) Watersheds targeted by program.

As stated earlier, this HGMP targets natural summer steelhead and proposed new hatchery production within the Touchet River (WRIA 32) only, which is a subbasin of the Walla Walla River. Another HGMP that will target the Walla Walla River (WRIA 32) and some of its other tributaries will be developed in the future.

1.16) Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

The LSRCP summer steelhead mitigation program has been active within the Touchet and Walla Walla river basins since 1985. A non-endemic hatchery-origin summer steelhead stock (Wells and LFH stock) has been used to achieve the mitigation goals. The NMFS Biological Opinion concluded that continued use of LFH hatchery steelhead constituted jeopardy for the listed population in the Touchet and Walla Walla rivers.

The first alternative action WDFW considered was developing a new broodstock and eventually eliminating the LFH stock summer steelhead from the basin. The new endemic stock's primary purpose would be continued mitigation under the LSRCP, while lessening the effects to the natural population (hatchery-reared endemic fish spawning in the upper Touchet Basin would be of the same stock). Direct hatchery supplementation (Integrated Recovery Program) was considered as an alternative, but since the natural population is considered stable, this hatchery action could potentially hurt the natural population more if efforts were directed that way.

The second alternative considered would be the elimination of LSRCP mitigation to protect the listed populations. This alternative was not considered acceptable as WDFW is still under legal mandates to provide mitigation under the LSRCP.

The third alternative considered would be to reduce LFH stock releases. However, this alternative didn't fully meet NMFS's Biological Opinion intent. This may still be considered an option in the future is NMFS determines a jeopardy level of the LFH stock in the Touchet River.

WDFW expects that efforts to increase basin productivity will continue, whether through habitat improvements within the basin or actions to improve migration corridor survival. If that happens, and endemic stock fish are used to contribute to natural spawning, then increases in natural production should occur.

SECTION 2. PROGRAM EFFECTS ON ESA-LISTED SALMONID POPULATIONS.

2.1) List all ESA permits or authorizations in hand for the hatchery program.

For the Lyons Ferry LSRCP program, WDFW currently has Section 10 Permits #1126 (research activities on the Tucannon and Asotin Creek), and #1129 (hatchery supplementation for Tucannon River spring chinook); USFWS Consultation with NMFS for LSRCP actions and the NMFS Biological Opinion; and a statewide Section 6 Consultation with USFWS (Bull Trout).

2.2) Provide descriptions, status, and projected take actions and levels for ESA-listed natural populations in the target area.

2.2.1) Description of ESA-listed salmonid population(s) affected by the program.

Washington Department of Fish and Wildlife has estimated natural and hatchery-origin summer steelhead escapement into portions of the Touchet River since 1987. The largest escapement was seen in 1988 when an estimated 1,094 fish spawned (WDFW 1999), an estimated 1,006 of which were natural-origin. While all others years have been lower than the 1988 season, and there is large yearly variation in escapement, about 410 natural spawners/year are believed to spawn in the upper basin. Limited trapping data from the Touchet adult trap has shown the population to be made up of 3 and 4-year old individuals (primarily 2-year freshwater age and one or two year ocean age). Rarely have 2 and 5-year old individuals been identified in the population. Touchet steelhead are typical of "A" run summer steelhead with more fish returning as 2 fresh + 1 salt age (55-70%) than as 2 salt age (30-45%). One-salt age fish average 59 cm in length while two-salt age fish average 67 cm with individuals as large as 80 cm (Martin et al 2000). Sex ratio varies between years and can be heavily skewed to females (as high as 70%) but is generally believed to average 60% females for most years.

Fish enter the Touchet River as early as June and as late as the following April. Redds have been observed near RM 45, with juveniles documented at RM 40 (in Waitsburg, Mendel et al 1999) upstream, including numerous smaller forks and tributaries (North Fork, South Fork, Wolf Fork, Robinson Fork, Coppei Cr., Patit Cr., etc.). Spawning is believed to begin as early as late February and continues through May. While hatchery and natural fish enter and spawn in the river at the same time, WDFW believes that spawning locations are spatially separated. The number of hatchery fish captured in the adult trap has varied, but has been documented at about 10% each year, though some years have been as high as 20% (Schuck et al, 1995-1997).

Juvenile summer steelhead rear successfully in the Touchet above RM 40, and are widely spread throughout the mainstem, each of the major forks, and smaller tributaries. Rearing success appears to be dependent upon habitat and water quality, which is poor below RM 40 and only moderate between RM 40-53 (Mendel et al 1999). Above RM 53, rearing conditions are generally good for steelhead. Juveniles will typically spend from one to three years in the Touchet River before migrating as smolts. Age of smoltification is likely determined by both genetic and environmental factors (growth and temperature). The Touchet River is productive and yearling smolts (Age 1) would likely be produced from the lower reaches where spring/summer water temperatures allow for accelerated growth. Smolts leave the Touchet River primarily between early April and late May. Smolt size of natural steelhead is unknown but probably averages 185 – 195 mm, similar to what has been documented in the Tucannon River. Hatchery smolts from the LFH stock have averaged between 195 – 215 mm at release. All hatchery LFH stock smolts have been released from Dayton Acclimation Pond (RM 53) since1987.

- Identify the ESA-listed population(s) that will be directly affected by the program.

Touchet River natural-origin steelhead is part of the listed Mid-Columbia River ESU and will be used to establish the new broodstock for an Integrated Harvest Program. As such, Touchet River natural steelhead will be directly affected by broodstock collection, which will very slightly decrease natural production in the basin for a few years until spawning adults from the program return.

- Identify the ESA-listed population(s) that may be incidentally affected by the program.

The proposed program may incidentally affect Touchet River bull trout. Juvenile hatchery steelhead (either smolts or fingerlings) may compete for food and space with naturally-rearing bull trout as some degree of extended rearing by steelhead is expected, but little overlap exists between the two species. Bull trout will also be captured in the adult trap. All bull trout captured will be sampled and immediately released after sampling. Trapping/sampling/handling of bull trout has been authorized by USFWS under a Section 6 Cooperative Agreement with WDFW. As a positive benefit to bull trout, any fingerlings that may be released into the system from the hatchery program, or additional natural production of juvenile steelhead in the Touchet River from the hatchery program, may serve as prey for bull trout.

2.2.2) Status of ESA-listed salmonid population(s) affected by the program.

- **Describe the status of the listed natural population(s) relative to "critical" and "viable" population thresholds**.

Touchet River summer steelhead was classified as depressed by WDFW (SASSI 1992) because of chronically low escapement levels. We are not completely certain of the replacement status of the population, but believe it to be at or just below replacement. As such, stochastic events pose significant genetic risk to the population because of low absolute population numbers. An interim escapement goal of 600 spawners was previously established (1992 SASSI). Escapement documented for portions of the Touchet River is listed in Table 5. Average escapement has been about 410 spawners/year, and is based on an expanded index redd survey that provides an estimate for about 80% of available spawning area. Based on these estimates, it is possible that the escapement goal listed in SASSI (1992) is not currently being met.

Table 5. Estimated number of natural and hatchery-origin spawning summer steelhead in portions of the Touchet River upstream of Dayton, 1987-2000.			
Brood Year	**Natural Origin**	**Hatchery Origin**	**% Natural**
1987	334	29	92
1988	1006	88	92
1989	214	19	92
1990	332	29	92
1991	193	17	92
1992	374	32	92
1993	484	31	94
1994	358	91	80
1995	388	96	80
1996 [a]	NA	NA	NA
1997 [a]	NA	NA	NA
1998	385	43	90
1999	184	27	87
2000	371	33	92

[a] Estimates not available for these years because spring river flows were too high or muddy to accurately count summer steelhead redds.

- Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data.

Parent-to-progeny ratio data are not currently available for Touchet River natural-origin summer steelhead, but WDFW monitoring and evaluation actions have been undertaken to gather such data. Natural juvenile production estimates in portions of the Touchet River for most years between 1986 – 2000 can be used to estimate survivals for early life stages (see figure below). No natural smolt production estimates are currently available, but WDFW may start operating a smolt trap in 2002 to monitor the natural smolt migration, and to evaluate natural production within the basin.

- **Provide the most recent 12 year (e.g. 1988-1999) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.**

Estimated natural and hatchery-origin spawning summer steelhead in portions of the Touchet River upstream of Dayton from 1987-2000 are presented in Table 5 (above). Data are compiled from LSRCP annual report for Lyons Ferry Summer Steelhead Hatchery Evaluations (1985-2000). Also, see Figure 1 for estimated Age

0 and Age 1+ natural-origin summer steelhead in portions of the Touchet River between 1992 and 2000.

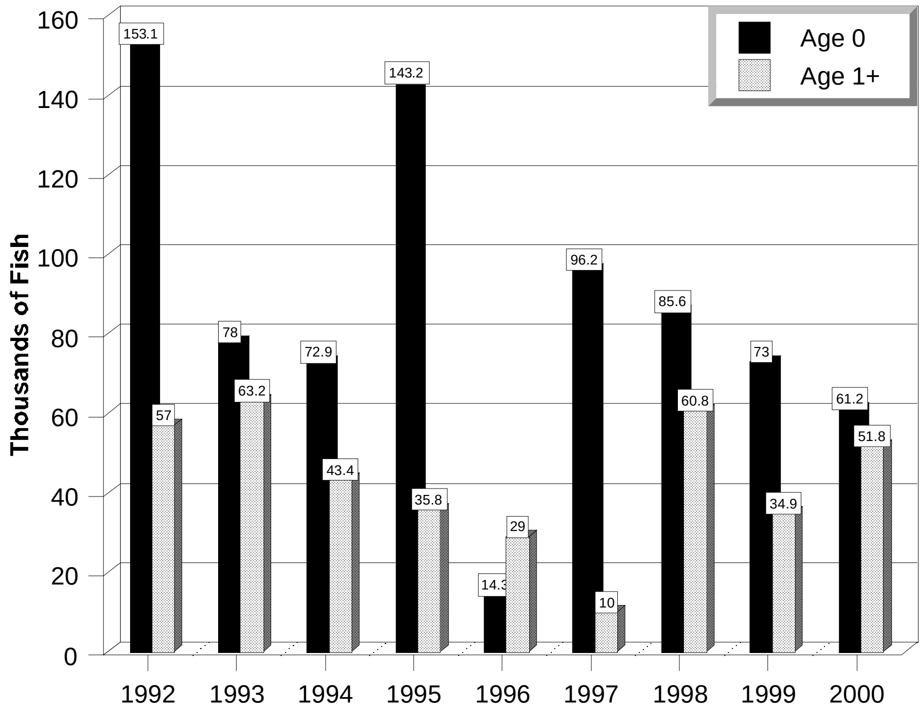


Figure 1. Estimates of Age 0 and Age 1+ natural-origin summer steelhead in portions of the Touchet River between 1992 - 2000.

- Provide the most recent 12 year (e.g. 1988-2000) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.

See Table 5 above

2.2.3) Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take.

Broodstock Trapping: Listed summer steelhead adults (Touchet River origin) will be trapped and collected for broodstock from February through June, which constitutes a direct take of listed fish (Take Table A). Adults will also be trapped, handled, and passed upstream during trap operations which may lead to injury and/or mortality to listed fish. The current temporary trap is located on federal property, but within the City of Dayton, Washington. Human disturbance or poaching of summer steelhead held in the trap was not experienced during operation of the trap in 1999-2000, or during previous years. The trap facility does have security measures (fence and lighting) to protect listed fish.

Bull trout are indigenous to Touchet River, and indirect takes of bull trout are anticipated through the broodstock collection program. Any bull trout encountered at the adult trap will be sampled (length, DNA, scales) and then passed immediately upstream, with minimal delay. Trapping and sampling of bull trout has been authorized by USFWS in accordance with a Section 6 Cooperative Agreement for the Endangered and Threatened Fish and Wildlife Program – Washington.

<u>Spawning, Rearing and Releases:</u> Spawning of the adults, egg incubation, and rearing/release of summer steelhead for 14 months from March through the following April has a potential for lethal take of these listed summer steelhead. Mortality can occur in association with fish culture activities and conditions which affect fish health and development, from handling procedures, fertilization procedures, water temperature, water quality, water flow, feeding success, and transport. Further, the release of endemic origin hatchery-reared Touchet River summer steelhead may incidentally affect (take) other listed salmonids in the Columbia River by displacement or competition.

Note: The LFH stock steelhead are currently released below primary rearing and spawning areas of natural summer steelhead. Should full production be reached as proposed in this program, is expected that most of the endemic brood progeny will be released in the same location (Dayton Acclimation Pond) as the current LFH stock releases.

<u>Monitoring and Evaluation:</u> Contact with listed summer steelhead during spawner escapement surveys (March through May), summer population monitoring (snorkeling/electrofishing), smolt trapping, PIT tagging programs, and estimates of residualism may potentially take listed summer steelhead. Each of these activities is described in more detail below.

Spawning Ground Surveys: Takes associated with spawning ground surveys (Take Table B) will occur in the form of "observe/harass" and from occasional carcass recovery of kelts. Spawning surveys for listed steelhead are conducted from March through May, and conducted once a week, with the intent to estimate spawning escapement into the Touchet River just above Dayton (does not include all tributaries of the Touchet River). Index sections, about 2-3 miles in length, are located in each of the major river forks (South, North, Robinson, and Wolf), and are surveyed multiple times throughout the season to document redds and how quickly redds fade from sight of the surveyors. During each survey, surveyors generally walk down the bank and not in the water when possible. Surveyors look for redds, record and mark their location, and look for live and dead fish. At the end of the season, more extensive areas of the river are walked (generally 50-

70%). The “final survey” redd count and redd visibility/fading rate are then used to estimate spawning escapement to the system. Properly conducted surveys are not expected to result in any direct mortality to spawning steelhead.

Snorkeling: Takes in the form of “observe/harass” occur during snorkel surveys (Take Table B). Snorkel surveys may occur between July-September, and will be conducted to monitor distribution and abundance of juvenile summer steelhead in portions of the Touchet River. Surveys are generally conducted with two people, both starting at the lower end of an index site. Each snorkeler moves upstream counting about ½ of the river. The total number of fish is then recorded and the site length and width are measured for total surface area. Total time to complete an index site varies, but is generally less than 15 minutes. We have no estimate of the degree of harm, injury, or mortality to listed fish associated with snorkeling activities, but it is believed to be very low. Based on observations during snorkeling, the fish observed move slightly when the snorkelers pass, but quickly re-establish themselves near their original location.

Electrofishing: Takes of listed steelhead in the Touchet River will occur during electrofishing surveys (Take Table B). Electrofishing surveys occur July through mid-August, and are conducted to monitor distribution and abundance of natural-origin steelhead. Electrofishing surveys and estimates may also be used to estimate the number of residuals that failed to migrate after release (see residualism below). Through previous studies, we have determined that Age 0 steelhead juveniles cannot accurately be sampled by snorkeling in some areas of the river (Schuck et al 1998), hence electrofishing surveys are necessary to estimate production of Age 0 natural steelhead. Estimating abundance and density of age-0 steelhead will be critical in the overall evaluation of success of the proposed hatchery program, as egg-to-fry survival within the natural system can then be calculated. Estimating abundance of Age 1+ natural steelhead is less critical than for age-0 steelhead, because without smolt trapping, it is impossible to evaluate when fish have left the system, or died of natural causes. However, the yearling data is simultaneously collected while sampling young of the year, and provides valuable trend information over time (see Figure 1).

Surveys are conduced using a modified Smith-Root backback electroshocker with upgraded, state of the art electronic components. Use of this programmable output waveform electroshocker has decreased the incidence of injury to small fish. Guidelines established by NMFS and WDFW will be followed when conducting surveys. Pertinent environmental information during surveys (conductivity and temperature for each site) will be recorded, as previously specified in Section 10 Permit #1126 (research activities on the Tucannon River).

PIT Tagging: Takes of listed natural and hatchery-origin steelhead will occur during PIT tag studies (Take Table B). Tagging will occur at the hatchery prior to smolt release, and/or at the Touchet River Smolt trap (described in the next section). Tagging of listed hatchery-reared fish with PIT tags will provide information on downstream migration performance (relative survival, migration speed, and timing) from the various release points in the Touchet River (Dayton Acclimation Pond, direct stream releases upstream). Tagging procedures follow established protocols used throughout the Columbia and Snake River basins by WDFW and other agencies when PIT tags are utilized. Mortality of PIT tagged fish is expected to be 1% or less.

Residualism: Estimates of residual steelhead from our endemic stock releases will be attempted through two activities. Electrofishing surveys during the summer will be used to estimate endemic hatchery-origin fish that failed to leave the stream following release. However, because there is an active trout fishery in Dayton, some of these may be taken out of the stream before electrofishing surveys are conducted. Therefore, WDFW will attempt to provide an estimate of the number of residual endemic hatchery stock before the fishery opens (June 1). Trained WDFW personnel will use hook and line and mark/recapture methods as described in Martin et al. (2000).

Smolt Trapping: [Currently, WDFW does not operate a smolt trap on the Touchet River. Funding within WDFW may become available to purchase and operate a smolt trap for the 2002 smolt migration.]

Takes of outmigrating listed steelhead (natural and hatchery-origin) will occur at WDFW's smolt trap (Take Table B) located on the mainstem Touchet River (exact location currently unknown). The trap will be operated March-June to capture natural and hatchery-origin steelhead to enable WDFW staff to estimate natural smolt production from the upper basin, and performance or hatchery releases (e.g. may provide an estimate of residualism from hatchery releases). Some of the natural and hatchery fish captured will be measured, weighed and released. Small groups of captured fish will receive a partial caudal fin clip for identification and transported back upstream about one to two miles and released to calculate trap efficiency. Other groups of fish (about 100/group) may be PIT tagged from the smolt trap to determine migration speed and relative survival from the smolt trap. Most fish will be counted and released immediately back to the stream (after recovery) to continue their migration. During peak outmigration, fish may be held in live boxes for two to three hours before release (mark/recapture trial, or PIT tagged). At other times of year the trap may be checked only once a day. Delayed migration will result for fish captured in the trap, and delayed mortality as a result of injury may also result. Mortality of natural steelhead is expected to remain below 0.5% (based on smolt trapping in the Tucannon River since 1997-present).

- Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take.

Operation of the adult trap during early spring to collect endemic broodstock will also indirectly take listed bull trout. Current trap operations may prevent or delay upstream migration of a small number of bull trout that approach. However, the current trap is estimated to be only 10-20% efficient. The trap/weir is not operated at other times of the year, and will therefore not interfere with bull trout migration. Trapping for bull trout has been authorized by USFWS through a Section 6 Cooperative Agreement.

- **Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish**.

WDFW has operated the current adult trap site (RM 53.3) during the springs of 1993, 1994, 1995, 1999 and 2000 (Table 6). The trap facility (water diversion for the Dayton Acclimation Pond) was not designed to trap adult fish, and therefore trapping has only provided a sub-sample of the run each year. Trapping of natural and hatchery-origin steelhead from 1993-1995 were attempts to estimate escapement, and to assess the feasibility of developing a new broodstock. The trap was heavily damaged following the 1996 flood on the Touchet River, and attempts to operate it again were not made until 1999 when it was apparent that a endemic broodstock would need to be developed for the future. Following the trapping in 1999, it appeared the existing trap could be used to start an endemic broodstock. During spring 2000, a small portion of the estimated natural run was trapped and collected for broodstock. However, because of high water flow and a shift in the river channel, the trap was less effective than in the past and the number of fish collected for broodstock fell short of the program goal. A new trap, or major modifications to the existing trap, will be needed to obtain adequate broodstock for the program in the future. During the five years of trapping, five mortalities have occurred in the trap (four in 1993, and one in 1999).

Table 6. Number of trapped natural and hatchery-origin adult steelhead captured at the Touchet River adult trap (RM 53.3) from 1993-1995, 1999, 2000.			
Brood Year	Natural Origin	Hatchery Origin	Total Trapped
1993	55	5	60
1994	44	2	46
1995	8	2	10
1999	42	6	48
2000	32	3	35

Twenty natural steelhead (13 females and 7 males) were collected for broodstock in 2000. No direct trap-related mortality was observed during broodstock trapping in 2000, and there was only one pre-spawning mortality of the fish collected. During 2000, all fish were live spawned and retained at LFH for rejuvenation and possible re-use. However, rejuvenation efforts failed and all fish died during the summer of 2000 from starvation. Only limited attempts at rejuvenation will be made in the future. WDFW will monitor current research in the Columbia basin on kelt rejuvenation for future possible use.

-Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).

See “Take” Tables A and B at back of document.

- Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.

The adult trap is not 100% efficient at trapping steelhead. The current diversion design allows fish to pass over the structure during spring flows. In cases where WDFW personnel are unable to check the trap daily, the trap box is closed for entry, but fish are able to jump the weir pickets. Where projected take may be exceeded, the trap can easily be removed to allow unrestricted passage.

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1) Describe alignment of the hatchery program with any ESU-wide hatchery or other regionally accepted policies (e.g. the NPPC *Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

Lyons Ferry Complex is part of the LSRCP Program. The current program's steelhead actions were stated as causing jeopardy to the listed natural population of summer steelhead under the NMFS Biological Opinion, and actions proposed under this HGMP are consistent with the Reasonable and Prudent Actions suggested by NMFS. Implementation of this HGMP will result in the development of a new endemic stock of steelhead for release into the Touchet River. Depending on success of this stock and decisions to be made by NMFS, the program may eventually drastically reduce, or eliminate, the current releases of LFH stock steelhead in the Touchet River. If that occurs, eventually all releases of hatchery-origin summer steelhead into the Touchet River will be derived from the endemic broodstock proposed within this HGMP.

3.2) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates. *Indicate whether this HGMP is consistent with these plans and commitments, and explain any discrepancies.*

This HGMP would be consistent with the following cooperative and legal management agreements. Where changes to agreements are likely to occur over the life of this HGMP, WDFW is committed to amending this plan to be consistent with the prevailing legal mandates.

- *U.S. v. Oregon* Management plan for the Columbia River (currently under negotiation).
- Lower Snake River Compensation Plan goals as authorized by Congress direct actions to mitigate for losses that resulted from construction of the four Lower Snake River hydropower projects.
- WDFW Wild Salmonid Policy. Fish and Wildlife is directed by State and Departmental management guidelines to conserve and protect fish and wildlife populations within Washington, and use of an endemic broodstock to minimize staying of hatchery fish is preferred. No other comprehensive management agreements are in effect.
- Fisheries Management and Evaluation Plan (FMEP). Developing FMEP's for Mid-Columbia fisheries are currently being drafted by WDFW which will describe in detail the current fisheries management within the Walla Walla Basin, including the Touchet River summer steelhead. Fishery management objectives within the draft FMEP and this HGMP are consistent.

3.3) Relationship to harvest objectives.

As an Integrated Harvest Program, development and use of an endemic Touchet River broodstock is intended to fulfill mitigation goals (see details in WDFW's FMEP for the Mid-Columbia, in progress), yet will allow for some conservation/recovery of the depressed stock. The LSRCP, as a mitigation program, defined replacement of adults "in place" and "in kind" for appropriate state management purposes. In addition, WDFW has identified the maintenance of abundant naturally spawning populations and harvest as valuable management goals (WDFW Wild Salmonid Policy, 1999).

3.3.1) Describe fisheries benefiting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

During the period 1987–1998, sport harvest from the Touchet River ranged between 207-635 fish during the annual September through mid-April fishery (WDFW 1987-1999). This represents a 23% in-river harvest rate on fish estimated to have returned to the Columbia River basin. Also, Touchet River-origin fish have contributed, and are expected to contribute in the future, to fisheries in the Columbia and Snake Rivers. These fisheries are consistent with LSRCP goals, and with *U.S. v. Oregon* management plans and principles for tribal and sport fisheries. All sport fisheries within the region are selective for hatchery-reared fish and require release of natural-origin summer steelhead (FMEP in progress). Sport fishing regulations in the Touchet River have been altered in recent years to reduce the incidental catch of natural fish by closing primary spawning areas of the river to fishing (FMEP). These actions work in concert with focused fishing effort on hatchery-origin fish to maximize natural escapement and minimize escapement of LFH summer steelhead stock into the upper Touchet Basin. Proposed marking of endemic brood releases, when appropriate and as described in this HGMP, will be used to regulate their take in fisheries as necessary.

The existing LFH stock used within the Touchet river has provided harvestable steelhead annually since 1985. Since the LFH stock will continue to be released in the Touchet River for a short time, harvest mitigation will continue, with the FMEP providing guidance to fisheries within the Walla Walla Basin. Limited hooking mortality is expected to occur as a result of sport fisheries on adults returning from endemic smolt releases (FMEP). As proposed, eventually all LFH summer steelhead stock releases will be discontinued and replaced with endemic stock smolt releases. Should full production of endemic steelhead be achieved, WDFW desires that all of the smolts be marked to allow harvest (pending agreement by NMFS to allow harvest of returning “hatchery-reared” endemic origin steelhead).

3.4) Relationship to habitat protection and recovery strategies.

Limited comprehensive review of the ecological health of the Touchet River watershed in relation to salmonid population status and recovery has been completed. Limiting factors such as water temperature, channel stability, sediment, and instream habitat are known to exist in the basin (WDFW unpublished data), but the extent of these problems is unquantified to date. Bonneville Power Administration is presently funding a review of the habitat and fishery resources of the Walla Walla basin (Mendel et al. 1999).

3.5) Ecological interactions.

Natural predators such as bull trout live sympatrically with Touchet River natural-origin steelhead, and may incidentally prey upon released hatchery-reared smolts of small size. Additionally, kingfishers, mergansers and other avian and mammal predators may prey on hatchery-reared juveniles/smolts as they migrate down the Touchet River.

The release, and subsequent return as adults, of endemic brood steelhead could affect existing ESA-listed populations of bull trout and summer steelhead. However, temporal and spatial overlap that could give rise to competitive or aggressive interactions for food and space will be minimized by the release of smolts near Dayton. Smolts are expected to quickly emigrate from the system. Also, they will be below bull trout spawning and juvenile rearing areas, but overlap with sub-adult and adult migratory habitat is likely. Some residualization of small juvenile fish, leading to their outmigration as a 2-year old smolt, may occur. Returning adults are expected to spawn concurrently with natural steelhead throughout their entire range in the Touchet River, increasing the abundance of juvenile steelhead throughout the basin and filling available habitat. In the initial program phase, complete marking (100%) of hatchery-reared endemic brood juveniles will allow returning adults to be enumerated and their contribution to the escapement (in absolute numbers and as a proportion of the run) documented. Some studies suggest that domestication of hatchery-reared salmonids may decrease their reproductive fitness. This loss of fitness could be transmitted to the offspring of these spawning adults. Life history characteristics of the hatchery-reared fish will be documented to compare their performance with the natural population. Size at migration, migration timing and performance, adult return timing and spawn timing will be documented and reported as part of the LSRCP Monitoring and Evaluation project.

For the first several years of hatchery endemic production, returning adults from the program will not be subject to harvest, but allowed to escape/spawn in the basin to contribute to the naturally-produced steelhead. There will be a short-term (3-5 years) increase in overall steelhead production from LFH (LFH stock and endemic brood), while the endemic broodstock programs are being developed and assessed, and mitigation production continues.

SECTION 4. WATER SOURCE

4.1) Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.

Presently, LFH will be where adults are held and spawned, eggs hatched and juveniles reared through the fingerling or smolt stage. Eight wells at LFH produce up to 137 cfs or 61,600 gpm of nearly constant 52^0 F, pathogen-free water.

Discharge from LFH complies with all NPDES standards and enters the Snake River and will not affect Touchet River water quality.

For smolts acclimated at the Dayton Acclimation Pond, water is removed from the Touchet River under a permit for non-consumptive fish propagation purposes. The Touchet River is a productive watershed flowing from the Blue Mountains of southeast Washington. Temperatures approach freezing in winter and rise to 80^0 F or greater during the summer near the mouth. Water temperatures while fish are acclimating range between 40-60^0 F. Adult summer steelhead spawn in the Touchet River in the spring when high river flows provide ample water for passage and spawning.

Two release strategies for steelhead smolts in the Touchet River are being proposed by WDFW. During the initial years of the program, approximately 50,000 (up to 75,000) smolts from the endemic stock program will be transported from LFH in April and released into the upper Touchet Watershed. In addition, 100,000 LFH stock steelhead smolts will be released from the Dayton Acclimation Pond. Should the full program be reached in the future, a maximum of 150,000 smolts from the endemic program will be released from the Dayton Acclimation Pond (RM 53.3). Currently, WDFW will leave the option open to release a maximum of 50,000 smolts into the upper watershed by direct stream release. Total endemic smolt program will not exceed 150,000 smolts. Five to ten weeks of acclimation may occur before releasing endemic brood smolts into the river from Dayton Acclimation Pond.

4.2) Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

Water intake screens at Dayton Acclimation Pond meet current NMFS screening guidelines, and effluent discharge is monitored, reported, and currently complies with NPDES standards. Water with drawl at LFH is through wells, and effluent is discharged to the Snake River, complying with NPDES standards.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

Broodstock will be collected at an adult trap in the mainstem Touchet River. While the trap is in operation, personnel will check the trap daily for fish. The trap may be checked more than once a day if a large number of fish is expected to be captured. Fish are netted from the trap box, and placed in a V-shaped trough, keeping water in the trough (has a calming effect on the fish so they can be sampled). After origin has been determined (natural, endemic broodstock, or hatchery production-LFH stock), the fish will either be collected for broodstock or passed upstream. Some natural-origin and endemic brood fish may have scales and DNA samples collected from them before release.

5.2) Fish transportation equipment (description of pen, tank truck, or container used).

Following sampling and origin determination, adults captured and identified suitable for hatchery broodstock are netted into a plastic transport tub fitted with re-circulating water and aeration, and hauled in the back of a pickup truck to LFH (elapsed time 30-60 min.). Up to five adults can be transported in the tub at one time.

5.3) Broodstock holding and spawning facilities.

Lyons Ferry Hatchery Complex is part of the LSRCP program that is responsible for mitigation production within the Snake and Walla Walla basins. There are no other facilities for the production of Touchet River endemic stock steelhead, and offspring of all fish removed from the basin will be returned to the Touchet River. Broodstock are hauled to LFH where they are placed in adult holding raceways (10'x 6'x 80') which receive constant temperature well water. Touchet River adults will be held separately from other steelhead broodstock to prevent accidental cross spawning. The raceways are enclosed over the middle one-third of the raceway length by the spawning building, where spawning occurs. Gametes are crossed, and water hardening begins within the spawning building. Fertilized eggs are then transported to the hatchery building for incubation.

5.4) Incubation facilities.

The incubation room at LFH is designed to accept and incubate eggs from individual females, through the eyed stage. Colanders nested in PVC buckets receive water via individual plastic tubes. Isolated incubation vessels allow disease sampling, detection and control. After eyeing is complete and virus sample results are received, eggs are consolidated into hatching baskets and transferred to hatching troughs. As the eggs hatch, fry fall through the hatching baskets and settle to the bottom of the rearing troughs where they absorb their egg sacks and eventually begin feeding. Substrate has not been recommended at this time in the hatching troughs due to questions about cleaning and disease control. The possibility of adding substrate to the hatching troughs will be explored further.

5.5) Rearing facilities.

Four intermediate indoor rearing tanks and 37 outside raceways available for rearing juveniles are available at LFH. Water supply is from wells as previously described. Feeding is by hand, through demand feeders, or by pneumatic feeders that can be programmed to feed throughout daylight hours.

a. Acclimation/release facilities.

Dayton Acclimation Pond has a volume of 348,000 ft^3, and is supplied with a maximum of six cfs (ft^3/sec) river water. During the first five years of the program, fish will be reared at LFH through mid-April, and then all of the endemic progeny will be transported the Touchet River upstream of Dayton and released directly to the river. Should the program reach full production in the future, fish would be reared at LFH until mid-February and then transported to Dayton Acclimation Pond for acclimation and release. A small portion of these may be held at LFH until mid-April and then direct stream released above Dayton. Release types and numbers will be agreed to by WDFW, co-managers, and NMFS. Should the fish be acclimated, acclimation on river water occurs for 5-10 weeks, then the screens are pulled and fish are allowed to volitionally migrate from the pond until mid-May. The pond is drained quickly and all fish left in the pond are released into the mainstem Touchet River in the city of Dayton. Any releases that are made directly to the river will be in locations with easy truck access.

5.7) Describe operational difficulties or disasters that led to significant fish mortality.

No significant mortality of Touchet natural steelhead has occurred to date. Only one Touchet natural steelhead collected for broodstock died in 2000. Pre-spawning mortality of BY2000 broodstock was attributed to stress of handling during the spawning process (checking weekly for ripe fish).

While not documented for the Touchet River endemic stock as yet, catastrophic losses have occurred in the LFH summer steelhead stock due to IHNV in the past (BY1989 100% loss). Following the loss in 1989, strict spawning protocols and procedures were implemented to prevent a similar event. These protocols and procedures will be strictly followed with the Touchet River endemic program.

5.8) Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

Strict operational procedures as laid out by Integrated Hatchery Operation Team (IHOT 1993) are followed at LFH. Where possible, remedial actions identified in a 1996 IHOT compliance audit are implemented. Staff is available to respond to critical operational problems at all times. Water flow and low water alarm systems, and emergency generator power supply systems to provide incubation and rearing water to the facilities are installed at LFH. Fish health monitoring occurs monthly, or more often, as required in cases of disease epizootics. Fish health practices follow PNWFHPC (1989) protocol.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.

6.1) Source.

Natural-origin steelhead captured in the Touchet River adult trap, or those captured hook and line above the city of Waitsburg will be used for broodstock. Propagation and release of the LFH stock summer steelhead will continue for several more years until the endemic stock can be documented as performing as expected.

6.2) Supporting information.

6.2.1) History.

Hatchery mitigation production releases into the Touchet River began in 1983. Broodstock originated from the Wells Hatchery (upper Columbia) and/or the Wallowa Hatchery (Snake River) programs through 1986. Beginning in 1987, a newly developing LFH stock was used as the primary source for releases. LFH stock was derived from adult returns of Wells and Wallowa origin releases at the hatchery. Complete losses at LFH of the BY1989 production because of IHNV caused the release of Wells/Skamania origin steelhead in 1990. Since 1991, only LFH origin broodstock have been used for Touchet River releases. Because of the inconsistent and incompatible nature of broodstock used in the past, and despite the success of the LFH stock, WDFW and co-managers desire to transition to a endemic broodstock to continue mitigation and assist with natural recovery under ESA. In 2000, broodstock were collected at random from the indigenous population, so no direct or unintentional selection is believed to have occurred. Genetic samples from the broodstock collected in 2000 and from juvenile populations throughout the Touchet River drainage will serve as a baseline to measure potential future genetic changes.

6.2.2) Annual size.

The proposed use of 18-44 pairs (collected) or 16-40 pairs (spawning) of steelhead for broodstock represents about 10-25% of the estimated natural fish escaping to spawn in the Touchet since 1989 (see previous tables). Collection is targeted to produce a yearly release of artificially propagated, genetically appropriate Touchet River steelhead smolts without jeopardizing natural production. Listing under ESA, concerns of hatchery fish straying on ESA listed stocks, and the potentially depressed population level have spurred WDFW and co-managers to examine the possibility of replacing the existing LFH stock with an endemic broodstock. The direct and indirect effects of proposed hatchery production are expected to aid in boosting the population to above the viable population threshold, and not present a conflict between ESA and harvest mitigation.

6.2.3) Past and proposed level of natural fish in broodstock.

The endemic broodstock will consist entirely of naturally-reared fish through BY2004. All returning endemic brood adults between BY2000-BY2007 will be allowed to spawn naturally and not be used for broodstock, because the small founding population for these years raises genetic concerns. Starting in BY2005, collection of endemic brood may increase as the program expands. Beginning in BY2007, up to 25% of the broodstock collected may be of first generation hatchery-reared endemic brood. At full production (40 spawning pairs), no more than 35% of the broodstock collected will be of identifiable first generation hatchery-origin endemic stock.

6.2.4) Genetic or ecological differences.

Hatchery endemic broodstock will initially be developed solely from natural-origin adults and should retain the genetic structure of the natural population. Genetic samples (fin clips or punches) will be collected from hatchery and natural-origin summer steelhead in the Touchet River every year. Samples will periodically be analyzed for population structure and genetic variation.

6.2.5) Reasons for choosing.

Endemic steelhead are optimally adapted for survival in the Touchet River. Washington Department of Fish and Wildlife and the co-managers believe they will be most capable of surviving, returning to, and effectively spawning in the Touchet River. Also, ESA concerns will be satisfied because they are of Touchet River origin.

6.3) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

Use of natural adult steelhead for broodstock will provide the greatest protection of the population’s genetic structure in this Integrated Harvest (plus conservation) type program. Broodstock will be collected over the entire run timing to the best of our abilities. Further, the LFH stock will be phased out over time (assuming success of the endemic stock), and the majority, if not all, of the new endemic stock will be released downstream of the primary spawning and rearing habitat in the Touchet River at Dayton Acclimation Pond.

SECTION 7. BROODSTOCK COLLECTION

7.1) Life-history stage to be collected (adults, eggs, or juveniles).

Adults.

7.2) Collection or sampling design.

Trapping operations occur at a modified water intake facility which supplies water for the Dayton Acclimation Pond (RM 53) located in the town of Dayton. Steelhead production below Dayton is limited, with the exception of Coppei Creek, which enters the Touchet River at RM 42. Natural steelhead enter the lower Touchet River from June of the preceding year through April of the year they spawn. The majority of the steelhead arrive in Dayton from February though May. Trapping for adults will occurs during those times, and focuses the catch on fish destined for the upper basin. Since the trap has been incorporated to the water intake structure, it is not very effective (~10-20% of each year's run), and limits the number of fish that are trapped. Fish are able to bypass the trap at virtually any springtime river flow, ensuring that a large percentage of the run is not delayed by trapping efforts. However, because of the poor trapping efficiency, hook and line sampling for broodstock may occur in some years to supplement broodstock collections. Natural fish that are captured in the trap (or captured hook and line) are considered to be a random sub-sample of the population.

Trapping in 2000 occurred from February through June, effectively sampling the majority of the run time. The first fish was trapped on 14 March, and the last fish was captured on 24 June. Trapping for broodstock was completed on April 28, 2000. This was done because the spawn timing at the hatchery was being overly protracted, and too few males were on hand to spawn with the females. Also, it appeared that three of the fish trapped after 24 June were from the 2001 run (2001 brood year) and should not be considered part of the 2000 run. There were 12 natural-origin steelhead (9 females, 3 males) captured after the decision had been made to stop collections. Had we continued to collect fish, we would have continued to be short on males for the program.

7.3) Identity

Presently and in the future, all LFH stock steelhead released into the Touchet River will receive an adipose clip or a combination adipose/left ventral/CWT for the next five years as the program is under evaluation. For evaluation purposes in the next five years, all endemic program hatchery smolts will receive a CWT and/or visual implant elastomer (VI) tag in the adipose eye tissue for external identification upon recapture at the adult trap. They may receive some other effective mark that can be identified upon return, but will not designate them as hatchery origin to local steelhead fisherman (not adipose of ventral fin clipped). WDFW is proposing that if the program expands to full production (after being proven successful), all endemic smolts (150,000) or fry outplants (25,000) will be marked with an adipose clip or adipose fin clip/CWT/ with VI or ADLV. This clip will allow them to be harvested by the local and downriver sport fisheries, fulfilling the LSCRP mitigation responsibilities.

The approach to mark all endemic brood smolts is consistent with WDFW's Wild Salmonid Policy. Further, this will allow for a more complete evaluation of the success and/or failure of the program in the future. Since the sport fishery is only marginally successful in removing all hatchery adults, even if fish are marked, many will escape into the upper watershed to spawn naturally.

7.4) Proposed number to be collected:

7.4.1) Program goal (assuming 1:1 sex ratio for adults):

Short Term: 36 adults for BY2000-BY2004.
Intermediate: Will be decided upon based on study results and trap capabilities.
Long Term: 88 adults at some time in the future

7.4.2) Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available: See Table 7.

Table 7. Number of females and males collected from 2000 BY Touchet Endemic summer steelhead, and the number of eggs and juveniles produced.

Brood Year	Collected Adults		Spawned Adults		Eggs Collected	Juveniles Produced
	Female	Male	Female	Male		
2000	13	7	12	7	53,139	37,970

7.5) Disposition of hatchery-origin fish collected in surplus of broodstock needs.

LFH stock origin hatchery fish collected at the Dayton Trap are passed immediately downstream of the trap into a sport fishery, or may be trucked downstream ~10 miles to the city of Waitsburg where they will have an even greater opportunity to be harvested in the fishery. All endemic adults produced from the hatchery program captured in the Dayton adult trap will be passed upstream to contribute to the spawning population in the upper basin. Should broodstock levels increase (approaching full program), a portion of the endemic origin fish may be collected for broodstock. All other hatchery-reared endemic fish will be passed above the trap for natural spawning. Live-spawned or kill spawned adults used as broodstock for the program will be returned to the Touchet River for nutrient enhancement. Carcass distribution will require the approval of WDFW's pathologist to ensure proper disease control measures.

7.6) Fish transportation and holding methods.

Adults are transported in plastic tubs or tank trucks with re-circulation aeration and/or oxygenation. To ameliorate hauling stress, salt (NaCl) is added to the water in quantities appropriate to the tub or tank volume (as described in WDFW fish health manual). Hauling time from the Dayton trap site to LFH is approximately 30-60 minutes, depending on road conditions.

Fish are held in brood stock raceways at LFH as previously described. All Touchet River broodstock are held in a separate raceway away from other stocks of steelhead at LFH. Fish are anesthetized using MS-222, degree of ripeness determined. Fish may be treated with a suite of approved chemicals to control fungus, parasites and bacterial diseases, as prescribed by WDFW fish health specialist. If ripe fish will be live spawned, they will be released back into the Touchet River to survive or contribute nutrients to the system. If the broodstock is killed, their carcasses will be returned to the Touchet River above Dayton for nutrient enhancement. During 2000 spawning we live spawned fish and attempted to re-condition them for future spawning, but were unsuccessful.

7.7) Describe fish health maintenance and sanitation procedures applied.

Monthly fish health inspections occur at LFH. Because of very low numbers of adults held in broodstock raceways, raceway cleaning is unnecessary. Treatments for fungal infections are applied as chemical flushes through the raceways.

7.8) Disposition of carcasses.

During 2000, Touchet River endemic broodstock were live-spawned and surviving males and females were retained in an attempt to rejuvenate them for subsequent re-spawning in 2001. The re-conditioning process failed during 2000, and will likely not be attempted in 2001. During 2001 spawning, Touchet River broodstock will be live or kill spawned and then returned to the system to survive or contribute nutrients. WDFW will continue to monitor results and success from re-conditioning experiments in the Columbia Basin. All Touchet River broodstock carcasses will be returned to the Touchet River for nutrient enhancement, after approval by a WDFW fish health specialist, if release of the carcasses is determined not to pose a significant fish health risk for the natural population.

WDFW proposes to return live fish or carcasses of killed spawned endemic broodstock to the upper Touchet River (above RM 53) in the future for nutrient enhancement (see **7.5** above).

7.9) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

With exception of the 2000 return, broodstock will be collected from throughout the natural run period to provide for random selection of adults from the entire adult population, prevent run timing divergence of the hatchery-reared population from the natural population, and provide for natural fish escapement into the habitat to spawn. Returning adults from natural brood smolt releases will be allowed to enter the spawning population without being used for the program, at least during the initial years of returns. All LFH stock fish will be placed downstream (0-10 miles) of the Dayton trap following capture to reduce their effects on the natural population upstream of the trap, and allow them a second opportunity to be harvest in the local sport fishery.

During broodstock trapping, measures will be taken to ensure the trap holding area is free of sharp objects that may cause injury to fish. Steps will also be taken to adjust attraction water entering the trap to discourage jumping of the fish captured. The current trap is located behind a secure fenced area. All fish handled (either to be passed or collected) are first placed in a V-shaped box containing water, with the head area covered with a rubber strip. This produces a calming effect on the fish that can then be sampled (scales, DNA, fork length, sex, external condition, identifying marks, etc.) without the use of anesthetic.

Disease control efforts at LFH (in accordance with PNWFHC and IHOT standards) will effectively control expansion of species specific or general salmonid diseases.

SECTION 8. MATING

Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously.

8.1) Selection method.

All males and females that have been collected for broodstock will be examined weekly during the spawning season to determine ripeness, and all fish will be spawned when ripe.

8.2) Matings.

Mating occurs in a 2x2 factorial cross to ensure the highest likelihood of fertilization. Jack or precocious steelhead (<20” TL) are generally not seen in the population. Likewise, repeat spawners are not known to exist in significant numbers in the population. WDFW has investigated the possibility of rejuvenating spawners at LFH and re-using them in the next brood year, with no success. This proposed action is experimental at this time, and WDFW will not likely attempt rejuvenation until more positive results are obtained from other researchers.

8.3) Fertilization.

Maintaining an equal sex ratio in the spawning population is the goal of the program. A 2x2 factorial spawning occurs (or a 1x2 when only one female is available) to increase the number of crosses. The small number of fish ripe on individual days usually limits spawning options. Males are usually limited to primary status on one half the eggs from two females. Where insufficient males are available to meet these criteria, males can be used as primary more than twice. In those circumstances, males will be used no more than four times as primary spawners (egg equivalent = 2 females). After fertilization, eggs are rinsed in a buffered iodine solution (100 ppm) to control viral and bacterial disease, and allowed to water harden for one hour in the same solution.

8.4) Cryopreserved gametes.

Cryopreservation was not used during BY2000 matings, but may be used in future brood years to increase diversity. Currently, no semen from natural-origin males has been preserved for use in the program.

8.5) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

Broodstock collection protocol will ensure that adults represent a proportional temporal distribution of the natural population. A 2x2 factorial mating scheme has been, and will be, applied to reduce the risk of loss of within-population genetic diversity for the small steelhead population that is the subject of this Integrated Harvest program

SECTION 9. INCUBATION AND REARING

Specify any management *goals* (e.g. "egg to smolt survival") that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.

9.1) Incubation:

9.1.1) Number of eggs taken and survival rates to eye-up and/or ponding.

LFH collects large numbers of LFH stock steelhead eggs annually. Following is the egg survival information at LFH for the six most recent brood years. One year of egg take information is available for endemic Touchet River steelhead (Table 8). (**Note:** IHNV control measures at LFH require the disposal of eggs from females that test positive for the virus. Discarded eggs are included in percent loss figures for the LFH stock, so figures may not represent true egg survival, but correctly depict survival under existing hatchery management protocol.)

Table 8. History of egg loss for LFH and Touchet River endemic stock summer steelhead at WDFW's Lyons Ferry Hatchery from 1994-2000.

Brood Year	Eggs Taken	% Loss to eye-up	Stock Origin
1994	1,352,296	33.5	LFH
1995	1,772,477	47.6	LFH
1996	1,614,636	28.7	LFH
1997	1,090,638	11.7	LFH
1998	1,460,967	36.1	LFH
1999	1,140,813	17.7	LFH
2000	**53,139**	**18.0**	**Touchet R. (endemic stock)**

9.1.2) Cause for, and disposition of surplus egg takes.

Estimated egg take and fecundity is based on only one year of spawning data. Egg survival to eye-up was about the same as the existing LFH stock of steelhead used. Number of eggs collected from adults trapped and ultimately the number of fry could exceed program needs. Furthermore, the disease history of natural broodstock is not known. Eggs in excess of the program needs will be retained to ensure the goal is met in case of unexpected loss from IHNV or other unexpected circumstances. (Note: present disease control protocol requires the disposal of eggs from IHNV positive female to control outbreaks of the disease within the hatchery). Because of the limited supply of endemic Touchet River fish, an exception from that protocol may be likely. LFH staff will work with the WDFW fish health specialist to ensure appropriate measures are taken to disinfect eggs and isolate fish from known IHNV positive females. Excess fingerlings above the smolt production goal would eventually be released within the Touchet River basin in areas of underseeded habitat. Any fingerling plants outside the Touchet River (or its tributaries) will be agreed to by the co-managers.

9.1.3) Loading densities applied during incubation.

Touchet natural steelhead eggs averaged 238/oz for BY2000. Eggs from individual females (10.5 -27 oz. ; 2,499 – 5,544) were incubated individually in two quart colanders through eye-up. Water flow through each colander is 2g/min. After eye-up, eggs are placed in hatching baskets with a capacity of 20,000 eggs each.

9.1.4) Incubation conditions.

Incubation, as with rearing, occurs with pathogen free, sediment free, 51-53 ^{0}F well water. The incubation building is fitted with back-up pumps to maintain flow through the troughs in emergency situations, and with secondary packed columns to maintain water oxygenation above 10 ppm. Flow monitors will sound an alarm if flow through the incubation troughs is interrupted. IHOT incubation protocols will be followed where practical.

9.1.5) Ponding.

Fish hatch from baskets and drop into troughs where they remain for 4-8 weeks after feeding commences. Fish are fed after all are buttoned up (usually 1-3 days post swimup). Fish are then moved to intermediate inside tanks (usually at about 800 fish/lb). Fish rear in intermediate tanks until July or when fish reach 100/lb, at which time they are transferred to outside raceways.

9.1.6) Fish health maintenance and monitoring.

Eggs are examined daily by hatchery personnel. Prophylactic treatment of eggs for the control of fungus is prescribed by a WDFW fish health specialist, and may include treatment with formalin or other accepted fungicides. Non-viable eggs and sac-fry are removed by bulb-syringe.

9.1.7) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

Eggs are incubated in pathogen free, silt free well water to ensure maximum egg survival and minimize potential loss from disease. The hatchery incubation room is protected by a separate low water alarm system and an automatic water reuse pumping system, and for the use of wells separate from the hatchery's main well field.

9.2) <u>Rearing</u>:

9.2.1) Provide survival rate data by hatchery life stage for the most recent twelve years (1988-99), or for years where dependable data are available.

Table 9. Survivals for LFH stock summer steelhead reared at LFH 1987-1998.

BY	Eggs taken	Eggs retained (%)		Fry produced (% egg-fry survival)		Smolts produced (% fry-smolt survival)	
1987	1,111,506	1,095,906	(98.6)	983,901	(89.8)	665,658	(67.6)[1]
1988	941,756	818,148	(86.9)	793,240	(96.9)	597,607	(75.3)

1989	1,263,237	957,074	(75.8)	941,000	(98.3)	0	(0.0)[2]
1990	2,570,676	1,483,485	(57.7)	1,002,320	(67.6)	635,635	(63.4)
1991	1,296,249	1,165,315	(89.9)	1,115,368	(95.7)	357,497	(32.1)[3]
1992	1,239,055	905,438	(73.1)	416,265	(46.0)	387,767	(93.2)[4]
1993	1,211,053	940,022	(77.6)	860,983	(91.6)	611,417	(71.0)
1994	1,352,296	899,350	(66.5)	845,316	(94.0)	558,130	(66.0)
1995	1,772,477	929,597	(52.4)	895,882	(96.4)	610,545	(68.2)
1996	1,614,636	1,151,363	(71.3)	1,148,114	(99.7)	807,253	(70.3)[5]
1997	1,090,638	962,705	(88.3)	809,845	(84.1)	569,264	(70.3)[6]
1998	1,460,967	934,247	(63.9)[7]	768,522	(82.3)		

1 An additional 203,857 were outplanted as pre-smolts (fry-outplant survival = 88.4%)
2 Losses to IHNV = 100%
3 Includes 92,116 fish planted as sub-smolts: 172,000 fish lost to bird predation in lake.
4 Destroyed 378,257 fish infected with IHNV.
5 Includes 191,000 fry planted into Sprague Lake.
6 Includes 15,207 fry planted into Rock Lake
7 308,666 eggs discarded from IHNV positive females

9.2.2) Density and loading criteria (goals and actual levels).

LFH raceway rearing density index criteria for steelhead will not exceed 0.26 lbs fish/ft^3. Where steelhead are reared in rearing ponds, densities can be 10% of the raceway maximum. Generally, indigenous brood juveniles will rear in vessels at a density index much less than 0.26 lbs fish/ft^3.

9.2.3) Fish rearing conditions

Raceways are supplied with oxygenated water from the hatchery's central degassing building. Approximately 1,000 gpm water enters each raceway through secondary degassing cans. Oxygen levels range between 10-12 ppm entering, to 8-10 ppm leaving the raceway, depending on ambient air temperature and number of fish in the raceway. Flow index (FLI) is monitored monthly at all facilities and rarely exceeds 80% of the allowable loading. Raceways are cleaned three times a week by brushing to remove accumulated uneaten feed and fecal material. Feeding is by pneumatic presentation from timed feeders, or by hand presentation.

9.2.4) Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.

Growth rate information for the LFH and Touchet stock steelhead for last year (e.g. 1999-00), or for most recent year available:

Lyons Ferry Steelhead (LFH Stock)

Year	Fish/LB	W/GRAMS	L/CM	Growth cm/Mo.	"K" Factor
March/99	2450	0.41	3.50		0.96
April/99	776	1.29	5.10	1.61	0.97
May/99	441	2.27	6.16	1.06	0.95
June/99	225	4.45	7.71	1.55	0.97
July/99	109	9.16	9.82	2.11	0.97
August/99	80	12.43	10.87	1.05	0.96
September/99	38	26.22	13.94	3.07	0.98
October/99	27	37.10	15.65	1.71	0.96
November/99	22	46.27	16.84	1.19	0.98
December/99	16	64.41	18.80	1.96	0.97
January/00	12	82.55	20.43	1.63	0.97
February/00	10	100.70	21.82	1.39	0.97

Touchet Steelhead Endemic Stock (Estimated Length/Weights and K-factors based on Fish/lb)

Year	Fish/LB	W/GRAMS	L/CM	Growthcm/ Mo.	"K" Factor
March					
April					
May					
June	1984	0.5	3.8		
July	593	1.7	5.5	1.7	0.9
August	326	3.1	6.9	1.4	0.94
September	220	4.5	7.8	0.9	0.95
October	57	8.0	9.0	0.4	0.95
November	45	10.0	10.2	0.4	0.92
December	33	13.7	11.1	0.9	1.00

9.2.5) Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.

See above tables.

9.2.6) Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing .

Fry/fingerling will be fed an appropriate commercial dry or semi-moist trout/salmon diet. Feeding occurs several times daily as necessary to provide the diet at a range of 0.7 – 1.1% B.W./day. Feed conversion is expected to fall in a range of 1.1 – 1.4 pounds fed to pounds produced. Due to the duration of spawning time from the natural steelhead, a variety of starter diets and feed schedules may be used to achieve a similar size among the fish before they are moved outside to the rearing raceways. This strategy will reduce the variation (CV's) in size of juveniles within the population, and may reduce the number of residuals observed when fish are eventually released as smolts.

9.2.7) Fish health monitoring, disease treatment, and sanitation procedures.

A WDFW fish health specialist monitors fish health as least monthly. More frequent care is provided as needed if disease is noted. Treatment for disease is provided by Hatchery Specialists under the direction of the Fish Health Specialist. Sanitation consists of raceway cleaning three times each week by brushing, and disinfecting equipment between raceways and/or between species on the hatchery site.

9.2.8) Smolt development indices (e.g. gill ATPase activity), if applicable.

Program goal for the endemic program will be to release fish between April 1-30 at 4.0-5.0 fish/lb. Pre-liberation samples will note smolt development visually based on degree of silvering, presence/absence of parr marks, fin clarity and banding of the caudal fin. No gill ATPase activity or blood chemistry samples to determine degree of smoltification, or to guide fish release timing is anticipated.

9.2.9) Indicate the use of "natural" rearing methods as applied in the program.

Camouflage covers over the outside raceways are planned at this time to help maintain the fright response. Demand or pneumatic feeders may also be used where possible to limit human disturbance or habituation to humans. Raceways are old enough that the walls and bottoms are of nearly natural coloration and texture, and promote natural looking fish.

9.2.10) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

Professional personnel trained in fish cultural procedures man Lyons Ferry Complex facilities. Facilities are state-of-the-art to provide a safe and secure rearing environment through the use of alarm systems, backup generators, and water re-use pumping systems to prevent catastrophic fish losses.

Fish will be reared under camouflage covers to maintain fright response to humans and other potential predators. Should full program be reached in the future, up to 100% of the endemic brood smolt releases could occur at Dayton Acclimation Pond. Options will be kept open at this time with the possibility of up to 50,000 smolt to be released in the upper basin as a direct stream release. For the fish released from the Dayton Acclimation Pond final rearing will occur on river water to provide acclimation/imprinting time and begin the conversion to natural feed sources present in river water.

SECTION 10. RELEASE

Describe fish release levels, and release practices applied through the hatchery program.

10.1) Proposed fish release levels

The following table shows proposed WDFW endemic stock juvenile or smolt releases (goal and maximum) into the Touchet River for the next five years while the program is being evaluated at initial production levels.

Age Class	Maximum Number	Goal	Size (fpp)	Release Date	Location	Stock
Eggs						
Unfed Fry						
Fry						
Fingerling	25,000	0	50	1 October	N.F. Touchet River RM 53-58 (direct)	Touchet
Yearling	100,000	100,000	4 - 5	1-30 April	Dayton Acc Pond (acclimated)	LFH
Yearling	75,000	50,000	4 - 5	1-30 April	N.F. Touchet River RM 53-58 (direct)	Touchet

10.1a) Proposed fish release levels

The following table shows proposed WDFW endemic stock juvenile or smolt releases (goal and maximum) into the Touchet River after the proposed full production has been reached. At this proposed level the LFH stock will have removed from the Touchet River.

Age Class	Maximum Number	Goal	Size (fpp)	Release Date	Location	Stock
Eggs						
Unfed Fry						
Fry						
Fingerling	25,000	0	50	1 October	N.F. Touchet River RM 53-58 (direct)	Touchet
Yearling	150,000	Up to 150,000	4 - 5	1-30 April	Dayton Acc Pond (acclimated)	Touchet
Yearling		Up to 50,000	4 - 5	1-30 April	N.F. Touchet River RM 53-58 (direct)	Touchet

10.2) Specific location(s) of proposed release(s).

Stream, river, or watercourse: Touchet River (WRIA 32)
Release point: RM 53-58
Major watershed: Touchet River
Basin or Region: Walla Walla Basin, Mid - Columbia River

10.3) Actual numbers and sizes of fish released by age class through the program.

N/A (No fish from the endemic broodstock have yet been released)

10.4) Actual dates of release and description of release protocols.

N/A (No fish from the endemic broodstock have yet been released)

10.5) Fish transportation procedures, if applicable.

Fish will be transported from LFH to release sites above the town of Dayton, Washington by tank truck. Transportation time can be up to one hour to 1 1/2 hours.

10.6) Acclimation procedures.

Should full production be reached in the future, all or a portion of the fish will be acclimated at the Dayton Acclimation Pond from 15 February through release in May (5-9 weeks). Rearing will occur on Touchet River water, which will provide acclimation to the chemistry and temperature regime of the Touchet basin. All other endemic production will be released directly to the stream in upper Touchet River (North Fork) basin in April as agreed to at that time with the co-managers.

10.7) Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

In the initial years of the program, all natural brood origin smolts will receive a coded wire tag in the snout and a VI tag in the adipose eye tissue for external identification upon return as adults. Should fry need to be released in October, they would be similarly marked, but a different VI tag color would be used to evaluate the success of fry/parr releases into the basin. Should the full smolt production be achieved in the future, all or a proportion of the fish will be released from Dayton Acclimation Pond. All of these fish will be adipose fin clipped, with a portion also receiving a left ventral fin clip and coded wire tagged for evaluation purposes.

10.8) Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.

Monitoring of fish numbers, growth and mortality at the hatcheries will provide reasonably accurate estimates of live fish throughout their rearing life. No fish surplus to program goals are expected in 2000/2001, and are not likely before 2004/2005.

Because fish are of Touchet River origin, all fish will be released into the Touchet River as smolts or fingerling. Should the program develop to the stage where the potential surpluses of juveniles for hatchery rearing may occur, those surpluses will be identified in early fall (1 October). The preferred alternative would be to release fingerling into the Touchet basin at that time, targeting river reaches that had population densities below carrying capacity, although surplus production is expected to be small. Another alternative would be to use surplus fingerling for reintroduction of steelhead into portions of the Walla Walla basin that are devoid of steelhead. This alternative would require the concurrence of co-managing Tribes, and Federal managers.

10.0) Fish health certification procedures applied pre-release.

Fish will be examined by a WDFW fish health specialist and certified for release as required under the PNWFHPC (1989) guidelines.

10.10) Emergency release procedures in response to flooding or water system failure.

Under conditions requiring release of fish at either hatchery in response to a water system failure, all fish would be hauled by truck to the Touchet River in the City of Dayton and released.

10.11) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

In the initial phases of the program, all fish will be released into the upper river basin that is currently underseeded by steelhead. Since the standard release strategy will consist of releasing smolts, most will orient to the river for a short time (1-10 days) and then emigrate. Some smaller fish may not be developmentally ready to emigrate and will assume residence in the river for up to another year. This number would be much greater in the case of fall fingerling plants. However, because the river is presently underseeded, WDFW does not expect these fish to represent a problem for juvenile steelhead or bull trout in the system. Fish rearing for an additional year within the Touchet will contribute to the conservation / recovery goal for the program as a life history variant of those emigrating as yearlings.

Should the program increase to full program as outlined in this HGMP, all or a larger percentage of the fish will be released from Dayton Acclimation Pond. Residual fish will likely be present in the river at the release location and downstream. Residual fish should not represent a problem for juvenile steelhead in the system at this location as natural production in that area of the river is low. Further, there is a fishery in the same area through the town of Dayton that will remove some of endemic hatchery stock residuals throughout the summer months.

Predation by hatchery fish on natural-origin smolts is less likely to occur than predation on fry (NMFS 1995). Salmonid predators are generally thought to prey on fish 1/3 or less their length (CBFWA 1996). Witty et al. (1995) concluded that predation by hatchery production on wild salmonids does not significantly impact naturally-produced fish survival in the Columbia River migration corridor.

The Species Interaction Work Group (SIWG;1984) reported that potential impacts from competition between hatchery and natural fish are assumed to be greatest in the spawning and nursery areas and at release locations where fish densities are highest (NMFS 1995). These impacts likely diminish as hatchery smolts disperse, but resource competition may continue to occur at some unknown, but lower, level as smolts move downstream through the migration corridor. Steward and Bjornn (1990), however, concluded that hatchery fish kept in the hatchery for extended periods before release as smolts (e.g. yearling salmonids) may have different food and habitat preferences than natural fish, and that hatchery fish will be unlikely to out-compete natural fish. Hatchery-produced smolts emigrate seaward soon after liberation, minimizing the potential for competition with natural fish (Steward and Bjornn 1990). Competition between hatchery-origin salmonids with wild salmonids, including steelhead, in the mainstem corridor was judged not to be a significant factor (Witty et al. 1995).

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

11.1) Monitoring and evaluation of "Performance Indicators" presented in Section 1.10.

11.1.1) Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

Estimate the contribution of Integrated Harvest program - origin summer steelhead to the basin and compare performance to the natural population.

Indicators: *3.1.2, 3.2.1, 3.2.2, 3.3.1, 3.3.2, 3.4.3, 3.4.2, 3.5.1, 3.5.3, 3.5.4, 3.5.5.*

1. Differentially mark all hatchery-reared summer steelhead fingerlings to allow for distinction from natural-origin fish upon return as adults on the spawning grounds. This will be accomplished by coded wire and visible implant elastomer tagging or another permanent, effective method. Adipose fin clipping may be used after 2005 if program is successful.

Indicators: *3.1.2, 3.2.2, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.5.3, 3.7.6, 3.7.7.*

2. Conduct trapping at permanent and temporary trap locations throughout the summer steelhead return (February to May) to collect broodstock for the hatchery Integrated Harvest program, enumerate overall returns, and to collect information regarding fish origin for the spawning escapement, and age class composition.

Indicators: *3.2.1, 3.3.1, 3.3.2, 3.4.4, 3.5.2, 3.7.6.*

3. Conduct spawning ground surveys to estimate spawners, and use in conjunction with trapping data to estimate the proportions of natural, endemic brood hatchery, and other hatchery-origin steelhead in the spawning population.

Indicators: *3.1.2, 3.2.1, 3.3.1, 3.3.2, 3.4.2, 3.5.3, 6.*

4. Estimate the number of natural, and naturally spawning hatchery-origin summer steelhead contributing to the Touchet River annual escapement.

Indicators: *3.3.2*, *3.4.2*, *3.4.3*, *3.4.4*, *3.5.5*, *3.7.8*.

5. Conduct summer electrofishing and snorkel surveys to estimate densities and the population of Age 0 and Age 1+ summer steelhead throughout the Touchet River basin to compare to historical records since 1984. Electrofishing and snorkel surveys will also be able to determine the degree of residual steelhead left in the river from hatchery endemic brood releases.

Indicators: 3.2.2, 3.3.2, 3.4.3, 3.4.4, 3.5.5.

6. Operate a smolt trap on the Touchet River to: 1) Estimate the number, timing, and age composition of natural-origin steelhead smolts from the river, 2) estimate the migration success to the smolt trap from releases of endemic stock hatchery steelhead in the upper basin, and 3) allow downriver migration comparison between natural and hatchery propagated by PIT tagging at the smolt trap. [Note: WDFW does not currently operate a smolt trap on the Tucannon River. There is a possibility that a smolt trap operation will begin in the spring of 2002.

Indicators: *3.1.2*, *3.2.1*, *3.2.2*, *3.3.2*, *3.4.4*, *3.5.4*, *3.5.5*.

7. Estimated SARs by brood year to determine if fish are surviving – escapement to hatchery, spawning grounds and harvest.

Monitor and evaluate any changes in the genetic, phenotypic, or ecological characteristics of the populations potentially affected by the program.

Indicators: *3.5.1*

Collect additional GSI data (allozyme or DNA-based) from regional summer steelhead adult populations to determine the degree to which discrete populations persist in the individual watersheds. Allozyme collections will be used for comparison with past collections to monitor changes in allelic characteristics, and with the intent to assess whether the hatchery endemic broodstock program negatively affects the genetic diversity of the natural population in the Touchet River.

Indicators: *3.4.3*, *3.4.2*, *3.5.3*.

Collect length and scale samples from all adults (natural and hatchery) returning to the trap on the Touchet River. Assess age structure of returning hatchery-origin fish and compare with natural fish. Compare length at age of natural and hatchery-reared returning adults.

Indicators: *3.4.2*, *3.4.4*

Conduct summer electrofishing and snorkel surveys to estimate densities and the population of Age 0 and Age 1+ summer steelhead throughout the Touchet River basin to compare to historical records since 1984. Electrofishing and snorkel surveys will also be able to determine the degree of residual steelhead left in the river from endemic stock hatchery releases.

Indicators: *3.2.2, 3.3.2, 3.4.3, 3.4.4, 3.5.5.*

4. Operate a smolt trap on the Touchet River to: 1) Estimate the number, timing, and age composition of natural-origin steelhead smolts from the river, 2) estimate the migration success to the smolt trap from releases of endemic stock hatchery steelhead in the upper basin, and 3) allow downriver migration comparison between natural and endemic stock hatchery steelhead by PIT tagging at the smolt trap. [Note: WDFW does not currently operate a smolt trap on the Touchet River. There is a possibility that a smolt trap operation will begin in the spring of 2002.

Assess the need and methods for improvement of mitigation / conservation activities in order to meet program objectives, or the need to discontinue the program because of failure to meet objectives.

Indicators: *3.4.3, 3.4.4, 3.5.4, 3.5.5, 3.6.1, 3.6.2*

1. Determine the pre-spawning and green egg to released smolt survivals for the program.
   a. Monitor growth and feed conversion for fingerling.
   b. Determine green egg to eyed egg, eyed egg to fry, and fry to released smolt survival rates.
   c. Maintain and compile records of cultural techniques used for each life stage, such as:
      - collection and handling procedures and trap holding durations for broodstock;
      - fish and egg condition at time of spawning;
      - fertilization procedures, incubation methods/densities, temperature unit records by developmental stage, shocking methods, and fungus treatment methods for eggs;
      - ponding methods, rearing/pond loading densities, feeding schedules and rates for juveniles;
      - release methods summarize results of tasks for presentation in annual reports.
   d. Identify where the propagation program is falling short of objectives, and make recommendations for improved production as needed.

Indicators: *3.4.1, 3.4.2, 3.4.3, 3.5.2, 3.6.2, 3.7.1, 3.7.6, 3.7.7.*

2. Determine if broodstock procurement methods are collecting the required number of adults that represent the demographics of the donor population with minimal injuries and stress to the fish.
   a. Monitor operation of adult trapping operations to ensure compliance with established broodstock collection protocols.
   b. Monitor timing, duration, composition, and magnitude of run at each adult collection site.

c. Maintain daily records of trap operation and maintenance (e.g. time of collection), number and condition of fish trapped, and environmental conditions (e.g. river level, water temperature).
d. Collect biological information on collection-related mortalities. Determine causes of mortality, and use carcasses for stock profile sampling, if possible.
e. Summarize results for presentation in annual reports. Provide recommendations on means to improve broodstock collection, and refine protocols if needed for application in subsequent seasons.

Indicators: *3.7.1, 3.7.4*

3. Monitor fish health, specifically as related to cultural practices that can be adapted to prevent fish health problems. Professional fish health specialists supplied by WDFW will monitor fish health.
   a. Fish health monitoring will be conducted by a Fish Health Specialist. Significant fish mortality to unknown causes will be sampled for histopathological study.
   b. The incidence of viral pathogens in broodstock will be determined by sampling fish at spawning in accordance with procedures set forth in PNWFHPC. Recommendations on fish cultural practices will be provided on a monthly basis, based upon the fish health condition of juveniles.
   c. Fish health monitoring results will be summarized as part of an annual report.

Indicators: *3.7.1, 3.7.2, 3.7.3, 3.7.4, 3.7.5.*

4. Monitor and document facility operation to ensure compliance with applicable standards and to ensure that operation does not adversely affect natural populations.

Collect and evaluate information on adult returns.

This element will be addressed through consideration of the results of previous elements, and through the collection of information required under adaptive criteria. All will be used as the basis for determining the progress toward program goals and whether the program should continue.

Indicators: *3.1.2, 3.2.1, 3.2.2, 3.3.1, 3.4.3, 3.5.1, 3.5.2, 3.6.1, 3.6.2*

1. Monitor the harvest of hatchery produced endemic stock Touchet and LFH hatchery stock steelhead in sport and treaty fisheries. Document trends in abundance.
   Collect age, sex, length, average egg size, and fecundity data from a representative sample of broodstock used in the endemic stock program for use as baseline data to document any phenotypic changes in the populations.
2. Compare newly acquired DNA analysis data reporting allele frequency variation of returning hatchery and natural fish with baseline genetic data. Determine if

there is evidence of a loss in genetic variation (not expected from random drift) that may have resulted from the endemic stock program.

3. Commencing with the first year of returns of progeny from naturally-spawned, hatchery-origin summer steelhead, evaluate results of spawning ground surveys and age class data collections to:
    a. Estimate the abundance and trends in abundance of spawners;
    b. Estimate the proportion of the escapement comprised by steelhead of hatchery lineage, and of natural lineage;
    c. Through mark sampling, estimate brood year contribution for hatchery lineage and natural-origin fish.

Use the above information to determine whether the population has declined, remained stable, or has been recovered to sustainable levels. The ability to estimate hatchery and natural proportions will be determined by implementation plans, budgets, and assessment priorities.

11.1.2) Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

Funding for most of the Monitoring and Evaluation will be provided by the LSRCP program as part of the ongoing mitigation program. Expanded Monitoring and Evaluation may require additional funding (e.g. smolt trapping).

11.2) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

1. Juvenile sampling at hatchery facilities will be conducted with accepted procedures to minimize stress and mortality from sampling. Sample sizes will be the minimum necessary to achieve statistically valid results for growth, tag retention and fish health.
2. Smolt trapping operations will ensure that holding time, stress and potential for injury of captured migrants is minimized. Marked groups for assessing trap efficiency will be the minimum necessary to achieve statistically valid results.
3. Adult trapping facilities will be monitored daily, or more often as necessary to prevent injury and unnecessary delay.
4. Spawning ground surveys will be conducted in such a manner to avoid scaring spawning fish off redds. Also, care will be taken when walking in areas with redds so eggs won't be accidentally crushed.
5. Snorkel surveys will be conducted only at a minimum number of sites necessary to achieve statistically valid results for population estimates. Displacement of fish will be kept to a minimum by snorkeling on days when water clarity and visibility are at maximum.

6. Electrofishing surveys will be conducted only at a minimum number of sites necessary to achieve statistically valid results for population estimates. If possible surveys will be conducted when water temperatures are below stressful levels to fish. WDFW will follow NMFS and WDFW electrofishing guidelines by: not shocking near redds or spawning adults, use of approved electroshockers, having experienced crew members during all shocking surveys, using DC current (pulsed or direct where appropriate), recording temperature, conductivity and electroshocker settings, and providing a good environment for fish holding/sampling after capture.

SECTION 13. ATTACHMENTS AND CITATIONS

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Witty, K., C. Willis, and S. Cramer. 1995. A review of potential impacts of hatchery fish on naturally produced salmonids in the migration corridor of the Snake and Columbia rivers. Comprehensive Environmental Assessment - Final Report. S.P Cramer and Associates. Gresham, OR. 76 pp.

SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by_____________________________ Date:_____________

Table A. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: _Summer Steelhead__ ESU/Population: Mid-Columbia / Touchet River Activity: Broodstock Collection, spawning, rearing and releases___________________				
Location of hatchery activity: Lyons Ferry Complex__ Dates of activity: Year Round_ Hatchery program operator: Harold (Butch) Harty				
	Annual Take of Listed Fish By Life Stage (Number of Fish)			
Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)	0	0	200	0
Collect for transport b)	0	0	0	0
Capture, handle, and release c)	0	0	500	0
Capture, handle, tag/mark/tissue sample, and released)	0	0	1000	200
Removal (e.g. broodstock) e)	0	0	88	0
Intentional lethal take f)	0	0	88	0
Unintentional lethal take g)	0	0	20	0
Other Take (specify) h)	0	0	0	0

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled, and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

Instructions:

1. *An entry for a fish to be taken should be in the take category that describes the greatest impact.*
2. *Each take to be entered in the table should be in one take category only (there should not be more than one entry for the same sampling event).*
3. *If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.*

Table B. Estimated listed salmonid take levels of by Research/Monitoring/Evaluation activity.

Listed species affected: _Summer Steelhead_ ESU/Population: Mid-Columbia / Touchet River__ Activity: Spawning, Snorkel, Electrofishing surveys and smolt trapping, residualism estimates_				
Location of hatchery activity: Touchet River _(Various locations) Dates of activity: Year Round___ Research/ Monitoring / Evaluation program operator: Joe Bumgarner__				
	Annual Take of Listed Fish By Life Stage (Number of Fish)			
Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)	2500	2500	25	0
Collect for transport b)	0	2000	0	0
Capture, handle, and release c)	4000	4500	20	0
Capture, handle, tag/mark/tissue sample, and release d)	1000	2500	25	0
Removal (e.g. broodstock) e)	0	0	0	0
Intentional lethal take f)	0	0	0	0
Unintentional lethal take g)	300	200	0	0
Other Take (specify) h)	0	0	0	0

a. Contact with listed fish though snorkeling.
b. Take (non-lethal) of juveniles/smolts captured and marked for smolt trap efficiency tests.
c. Take associated with smolt trapping operations, electrofishing, and hook and line methods to estimate residuals, where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to PIT tagging and/or bio-sampling (length/weight and scales) of fish collected through smolt trapping operations or electrofishing surveys prior to release.
e. Listed fish removed from the wild and collected for use as broodstock
f. Intentional mortality of listed fish during smolt trapping or electrofishing.
g. Unintentional mortality of listed fish, including loss of fish during transport during smolt trapping or holding after electrofishing.

Instructions:

1. An entry for a fish to be taken should be in the take category that describes the greatest impact.
2. Each take to be entered in the table should be in one take category only (there should not be more than one entry for the same sampling event).
3. If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.

Appendix L - CTUIR comments on WDFW HGMP

DEPARTMENT of
NATURAL RESOURCES

Tribal Fisheries
Program

CONFEDERATED TRIBES
of the
Umatilla Indian Reservation

P.O. Box 638
PENDLETON, OREGON 97801
Area code 541 Phone 276-4109 FAX 276-4348

January 11, 2001

Richard Turner
National Marine Fisheries Service
525 NE Oregon St.
Portland, OR 97232

Dear Mr. Turner;

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) have participated in the development of the Hatchery and Genetic Management Plan (HGMP) for the Touchet River Endemic Summer Steelhead Program being authored by the Washington Department of Fish and Wildlife (WDFW). The CTUIR views this program differently from WDFW, as Integrated Recovery rather than Integrated Harvest. However, CTUIR agrees with the near term measures as presented in the HGMP as those actions support recovery by releasing juveniles into natural production areas and not selectively marking for harvest. Therefore, CTUIR supports authorization of the near term actions proposed in the HGMP in order that broodstock collection for the program can begin.

The CTUIR also has concerns related to the long term goals and actions of the program as presented in the HGMP. It is the position of CTUIR that mining of natural populations for hatchery broodstock programs should dictate that supplementation be a primary function of those programs. While the Touchet River HGMP does support this concept in the near term actions presented, the long term actions proposed diverge from this approach. The CTUIR feels that further discussion of the long term goals and actions are needed in the future as the endemic program develops and the Lyons Ferry stock program is phased out.

Sincerely,

Gary A. James, Fisheries Program Manger
Confederated Tribes of the Umatilla Indian Reservation

CC: Fish and Wildlife Committee
Columbia River Intertribal Fish Commission
Mark Schuck, Glen Mendel, Butch Harty, WDFW

TREATY JUNE 9, 1855 ✦ CAYUSE, UMATILLA AND WALLA WALLA TRIBES

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