

Draft

Burnt

Subbasin Summary

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Burnt Subbasin Summary

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Burnt Subbasin Summary

Subbasin Description

General Description

Subbasin Location

Located in the northwest portion of the Middle Snake Ecological Province, the Burnt subbasin encompasses an area of about 1,100 mi² in northeastern Oregon (Figure 1). The subbasin is defined by the Blue Mountains to the west, the Snake River to the east, the Burnt River Mountains to the south, and the Powder River drainage to the north. Subbasin corners are approximated by the following Townships and Ranges: NW corner (T10S/R35E), NE corner (T10S/R44E), SW corner (T14S/R35E), SE corner (T14S/R45E).

The North Fork Burnt River flows southeast 28 miles from its origin in the Greenhorn Range to Unity Reservoir where it joins the South, West and Middle forks of the Burnt River and numerous other streams with headwaters in the Wallowa Whitman National Forest. From Unity Reservoir, river mile (RM) 77, the Burnt River flows generally east to the community of Bridgeport (RM 48), turns northeast to the community of Durkee (RM 28), then south-southeast through Weatherby (RM 18.5) and Huntington (RM 2.5) to join the Snake River at RM 328.

Major streams flowing into the Burnt River below Unity Reservoir are Camp, Big, Pritchard and Dixie creeks. Camp Creek originates in the Wallowa Whitman National Forest near the Monument Rock Wilderness Area and flows north-northeast to join the Burnt River at RM 71. Big Creek begins near Sunflower Flat and flows south-southeast into the Burnt River at RM 66. Pritchard Creek finds its source in springs northeast of the community of Pleasant Valley and flows generally south to meet the Burnt River near Durkee (RM 27.5). Dixie Creek begins in the southern portion of the subbasin flowing southeast through Rye Valley then east to join the Burnt River at RM 12.

The Burnt subbasin is almost entirely within Baker County although small portions of Grant and Malheur counties are included (Figure 1). The population of Baker County is about 17,000.

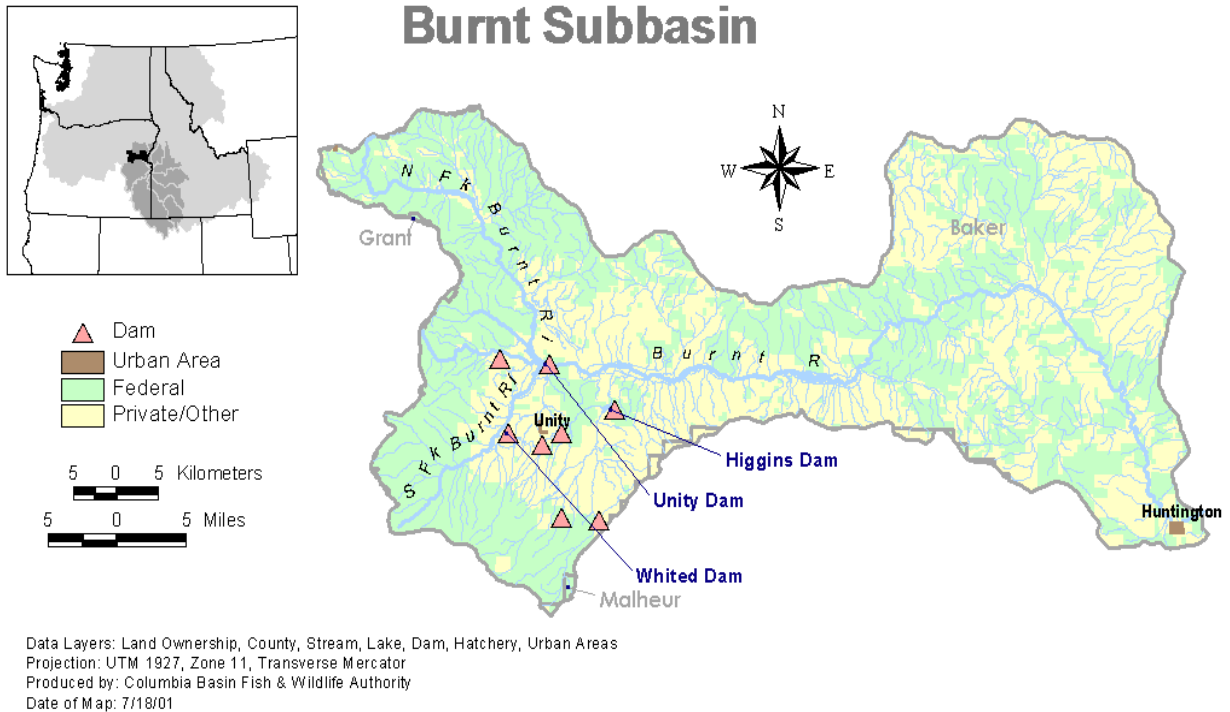


Figure 1. Burnt Subbasin of the Middle Snake Province, northeast Oregon

Drainage Area

The Burnt River subbasin is comprised of a single watershed, the Burnt, with a drainage area of about 1,100 mi² and a perimeter of 219 mi. This watershed drains about a third of Baker County. Notable streams in the Burnt subbasin are listed in Table 1.

Climate

The major influence to the regional climate is provided by the Cascade Mountains lying nearly 200 miles to the west. This mountain range forms a barrier against potential modifying effects of warm, moist fronts emanating out of the Pacific Ocean. As a result, the overall climate is Temperate Continental – cool summer phase. The relief of the Blue Mountains creates several localized climatic effects. The diversity of landscapes between mountain ranges, rolling topography and deep, dissected canyons influences local climatic patterns. Light precipitation, low relative humidity, rapid evaporation, abundant sunshine and wide temperature and precipitation fluctuations are characteristics of this climate. The mean annual temperature is 45.5°F, the daily maximum was 106°F (08/04/1961) and the daily minimum was -39°F [(12/30/1978) USBR dataweb]. The Unity Ranger Station has recorded temperature extremes of 103° F on 2 August, 1961 and -33° F on 21 December, 1990. The majority of annual precipitation, which averages 10.87 in., falls as snow during winter. Late summer and early autumn provide the area with convectional storms resulting from masses of cool air crossing the Cascades and passing over the mountains at high elevation. The hot, dry surface air violently mixes with the cool, moist upper air mass to provide lightning storms.

Table 1. Notable streams in the Burnt subbasin and their points of confluence (RM) with the Burnt River or its tributaries

Main Stream	Tributary (RM)	Tributary (RM)
Burnt River	Dixie Creek (12)	
	Sisley Creek (18.5)	
	Manning Creek (25)	
	Pritchard Creek (27.5)	
		Durkee Creek (0.25)
		Lawrence Creek
	Clarks Creek (46)	
	Auburn Creek (48)	
	Big Creek (65)	
	Camp Creek (71)	
		Cow Creek
		East Camp Creek
		West Camp Creek
	South Fork Burnt River (77)	
	Last Chance Creek (11)	
Middle Fork Burnt River (77)		
West Fork Burnt River (77)		
North Fork Burnt River (77)		
	China Creek (6.5)	
	Trout Creek (14)	
	Camp Creek (15)	
	Geiser Creek (21)	

Note: Those streams that show a confluence at RM 77 flow into Unity Reservoir and exit it at RM 77 as the Burnt River.

Topography

The North, West, Middle and South Forks of the Burnt River all begin in the rugged Blue Mountains at elevations near 7,000 feet. The Whitney Valley, on the North Fork Burnt River, lies at an elevation of about 4,300 feet. The Burnt River Valley is at an elevation of about 3,400 feet at Hereford and about 3,200 feet at Bridgeport, 21 river miles downstream. The Burnt River joins the Snake River at an elevation of about 2,000 feet.

Gradients on the Burnt River and its tributaries are widely variable as the streams leave the mountains and flow through the lower, shallower valleys. Gradients on the North Fork range from 1-2% in low elevation areas to 6% in the headwaters. The South Fork also has a gradient of around 1% in low elevation areas but as high as 11.5% in the upper reaches (Wallowa Whitman National Forest 1990, Wallowa Whitman National Forest 1995).

Geology

The North Fork of the Burnt River headwaters in the upper reaches of the Whitney Basin then follows a broad synclinal valley then cuts through a canyon in its lower reaches. A volcanic conglomerate, known as the Clarno, forms midslope plateaus and is the predominate unit in the North Fork sub-watershed. The Strawberry volcanics border the North Fork on the west and southwest and predominate in the South Fork Burnt River sub-watershed. The Strawberry volcanics consist of basalt, basaltic andesite and andesite. The other major rock group in the South Fork is a mixture of metavolcanics and metasediments associated with the Olds Ferry Terrane.

Hydrology

The headwater streams of the Burnt River subbasin are located in the Blue Mountains at elevations between 6,000 and 7,000 feet. The timing and amount of spring runoff is dependent on winter snowpack depth and condition as well as spring weather factors such as temperature and rainfall. Seasonal peak flows generally occur in late April and early May (Jerry Rodgers, OWRD, personal communication, 2001).

Average discharge of the South Fork Burnt River is 27.2 cubic feet per second (cfs) and the average annual discharge is 19,710 acre-ft. The bankfull discharge of the South Fork near Barney Creek is about 186 cfs, measured April 29, 1965 (Wallowa Whitman National Forest 1999). Historic stream flow data for the North Fork Burnt River are minimal (Wallowa Whitman National Forest 1995). Data collected by the US Bureau of Reclamation (USBR) in water year 1998 show a minimum flow of 1.1 cfs in early September and a maximum flow of 291 cfs in early April. During the same water year (1998), minimum flows on the mainstem Burnt River were 63 cfs below Unity Dam on 8 June, and 70 cfs at Huntington near the mouth on 6 September. Maximum flows were 267 cfs below Unity Dam on 1 June and 1,070 cfs at Huntington on 1 June (USBR 1999). The 1998 annual discharges (acre-feet) of selected Burnt River tributaries are shown in Table 2.

Table 2. Water year (April 1 - Sept. 30) 1998 discharge of selected Burnt River tributaries

Tributary Name (RM confluence)	Water Year 1998 Discharge in Acre-feet
Dixie Creek (12)	11,923.5
Manning Creek (25)	2,627.6
Pritchard Creek (27.5)	3,395.8
Clarks Creek (46)	4,773.2
Auburn Creek (48)	2,380.6
Big Creek (65)	1,654.8
Camp Creek (71)	1,085.4

Source: USBR 1999

Three aquifer types are found in the Burnt River subbasin although approximately 62% of the subbasin has no principal aquifer (Table 3).

Table 3. Principal aquifers in the Burnt River subbasin, Oregon

Aquifer	Square Miles	Percent of Subbasin	Rock Type
No Principal Aquifer	687	62.3	N/A
Pacific Northwest basin-fill aquifers	291	26.4	Unconsolidated sand and gravel
Miocene basaltic-rock aquifers	123	11.2	Basalt and other volcanic rock
Volcanic and sedimentary-rock aquifers	2	0.2	Basalt and other volcanic rock

Most surface- and groundwater use is for irrigation. There are about 80 water right holders in the Burnt subbasin. The water in the Burnt River subbasin is fully appropriated (J. Franke, Burnt River Irrigation District, personal communication, October 2001); during the summer there is no remaining unappropriated water. In low-water years, available water may be inadequate to supply junior water rights holders.

Water Quality

The Oregon Department of Environmental Quality (ODEQ) has identified several stream segments in the Burnt River subbasin as water quality limited (Figure 2, Table 4). Water quality limited means instream water quality fails to meet established standards for certain parameters for all for a portion of the year. Oregon's 1998 303(d) List of Water Quality Limited Waterbodies identifies four parameters of concern in the Burnt subbasin. These are chlorophyll A, flow modification, habitat modification, sedimentation and temperature.

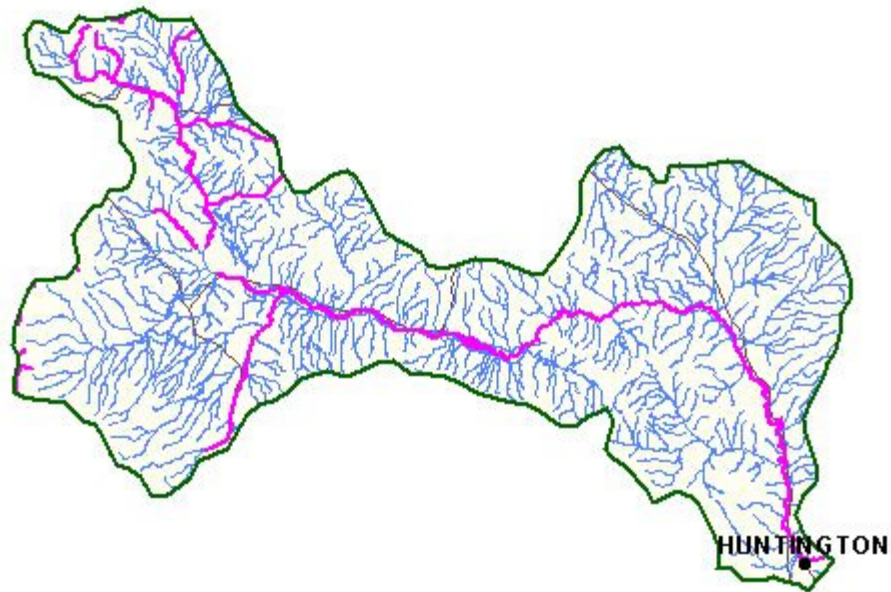


Figure 2. Burnt subbasin 303(d) listed streams (EPA)

Table 4. Burnt River subbasin 303(d) listed stream segments and parameters of concern

Stream Segment	Parameters of Concern
North Fork Burnt River	Temperature, Sedimentation, Habitat Modification, Flow Modification
Burnt River, mouth to Clarks Creek	Temperature, Flow Modification
Burnt River, Clarks Creek to Unity Reservoir	Temperature, Flow Modification, Chlorophyll A
West Fork Burnt River	Sedimentation, Habitat Modification
East Camp Creek	Temperature
Camp Creek	Sedimentation, Habitat Modification
China Creek	Temperature, Sedimentation, Habitat Modification
Geiser Creek	Sedimentation, Habitat Modification
Gimlet Creek	Sedimentation, Habitat Modification
Patrick Creek	Temperature, Sedimentationm Habitat Modification
Trout Creek	Temperature, Sedimentation, Habitat Modification
Meadow Creek	Temperature

Source: ODEQ

Water quality parameters (and standards) of temperature (64°F/55°F, rearing/spawning), dissolved oxygen (98% sat), habitat modification (pool frequency), and flow modification (flows) relate to the beneficial use for fish life.

Table 5 describes how temperature affects cold-water fish mortality. Most water quality problems in the Burnt River subbasin likely stem from poor riparian condition due to legacy forestry, grazing and mining activities as well as current mining, some improperly managed livestock grazing, cumulative effects of timber harvest and road building, water withdrawals for irrigation, and agricultural activities.

Table 5. Modes of thermally induced cold-water fish mortality

Modes of Thermally Induced Fish Mortality	Temperature Range	Time to Death
<i>Instantaneous Lethal Limit</i> – Denaturing of bodily enzyme systems	> 90°F > 32°C	Instantaneous
<i>Incipient Lethal Limit</i> – Breakdown of physiological regulation of vital bodily processes, namely: respiration and circulation	70°F to 77°F 21°C to 25°C	Hours to Days
<i>Sub-Lethal Limit</i> – Conditions that cause decreased or lack of metabolic energy for feeding, growth or reproductive behavior, encourage increased exposure to pathogens, decreased food supply and increased competition from warm water tolerant species	64°F to 74°F 20°C to 23°C	Weeks to Months

Reproduced from ODEQ 2000.

Water temperature is a concern in the Burnt River drainage; eight of the twelve 303(d) listed stream segments are listed for temperature. The USBR collected data in 1998 for the Burnt River Temperature Study (USBR 1999). This report includes stream flow data, stream temperature data for the Burnt River and main tributaries, meteorological data, and stream cross-section measurements. During data collection for the above report the USBR recorded minimum and maximum daily water temperatures. The highest daily maximum reported for the mainstem Burnt River below Unity Reservoir was 72.8° F August 16; and at Huntington 79.8° F July 29. The highest daily maximum on the North Fork Burnt River was 83.1° F July 17 and on the south Fork Burnt River 70.5° F July 17.

Federal law requires that water bodies that appear on the 303(d) list be managed to meet state water quality standards. The ODEQ’s comprehensive approach for protecting water quality includes developing pollution load limits, known as Total Maximum Daily Loads (TMDLs) for both point and non-point sources. ODEQ is committed to having federally approved TMDLs on all waterbodies listed on the 1998 303(d) list by the end of the year 2007. The target date for completion of a TMDL in the Burnt subbasin is 2005.

Noxious Weeds

The spread of noxious weeds has been described as a “biological emergency” (ODA 2001). Alien species in general are second only to habitat loss and degradation among threats to biodiversity (Wilcove et al. 2000). In Oregon, noxious weeds pose a serious economic and environmental threat. Oregon loses \$83 million annually to 21 of the 99 state-listed

noxious weeds (ODA 2001). These invasive, mostly non-native, plants choke out crops, destroy range and pasture lands, clog waterways, affect human and animal health and threaten native plant communities. They are considered one of the most serious natural resource and economic issues facing Baker County (Baker County 2001).

During the last 10 years, the number of state-listed noxious weeds in Oregon has increased by 40 percent. The recent detection, in Oregon, of two aggressive invasive weeds, kudzu and smooth cordgrass, has sounded a serious alarm about new invasions. The increasing spread of established weeds is equally alarming; infestations of some invasives have expanded up to 42 fold in Oregon since 1989 (ODA 2001).

Baker County is designated as a Weed Control District, formed under ORS 570.505. Its purpose is to contain, control and eradicate noxious weeds in its jurisdiction. In addition, the Upper Burnt River Weed Control District is recognized as an informal sub-district (not petitioned) within Baker County. The Burnt River District assists with weed management activities in their area and they are guided by their own strategic plan and mission statement. A total of 37 noxious weeds have been listed by the Baker County Weed District as present in the county (Table 6).

Table 6. Baker County, Oregon noxious weeds

Common Name	Scientific Name	Common Name	Scientific Name
rush skeletonweed	<i>Chodrilla juncea</i>	hoary cress (white top)	<i>Cardaria draba</i>
common bugloss	<i>Anchusa officianalis</i>	Dalmatian toadflax	<i>Linaria dalmatica</i>
yellow toadflax	<i>Linaria vulgaris</i>	purple loosestrife	<i>Lythrum salicaria</i>
chickory	<i>Chchorium intybus</i>	Scotch thistle	<i>Onopordum acanthium</i>
common tansy	<i>Tanacetum vulgare</i>	diffuse knapweed	<i>Centaurea diffusa</i>
spotted knapweed	<i>Centaurea maculosa</i>	bur buttercup	<i>Ranunculus testiculatus</i>
yellow starthistle	<i>Centaurea soltitalis</i>	tansy ragwort	<i>Senecio jacobaea</i>
medusahead rye	<i>Teaniatherum caput-medusa</i>	jointed goatgrass	<i>Aegilops cylindrica</i>
Mediterranean sage	<i>Salvia aethiopsis</i>	musk thistle	<i>Carduus nutans</i>
perennial pepperweed	<i>Lepidium latifolium</i>	leafy spurge	<i>Euphorbia esula</i>
Canada thistle	<i>Cirsium arvense</i>	common teasle	<i>Dipsacus fullonum</i>
field dodder	<i>Custuca campestris</i>	puncture vine	<i>Tribulus terrestris</i>
poison hemlock	<i>Conium maculatum</i>	common mullein	<i>Verbascum thapsus</i>
St. Johnswort	<i>Hypericum perforatum</i>	moth mullein	<i>Verbascum blateria</i>
waterhemlock	<i>Circuta maculata</i>	morning glory	<i>Convolvulus sepium</i>
Russian knapweed	<i>Cantaurea repens</i>	Russian thistle	<i>Salsola tenuifolia</i>
Dyer's woad	<i>Isatis tinctoria</i>	kochia	<i>Kochia scoparia</i>
buffalo burr	<i>Solanum rostratum</i>	black henbane	<i>Hyoscyamus niger</i>
Venice mallow	<i>Hibiscus trionum</i>		

Land Uses

Long before the arrival of pioneers and settlers, the Cayuse, Umatilla and Nez Perce Indians utilized the hunting and fishing grounds of the Burnt river subbasin (Wallowa Whitman national Forest 1999). Early Euro-American settlers came to the area on the Oregon Trail as it passed through Baker County. Settlement spread to the upper reaches of the watershed with the discovery of gold in the 1860's (Powder Basin Watershed Council, draft May 2001).

Land ownership and use statistics have not been compiled for the Burnt subbasin specifically. Information for Baker County and/or the Powder Basin including the Burnt River and Pine Creek drainages is presented here as representative of the subbasin. References here to land use or ownership in the “Powder Basin” or “Basin” include the Burnt River and Pine Creek.

The federal government is the single largest land manager in the Powder Basin (Figure 1). Within Baker County, the BLM manages 367,168 acres and the Forest Service manages 604,927 acres (Powder Basin Watershed Council 1996). Approximately half of Baker County is federally owned (G. Young, Baker County Senior Planner, personal communication, September 2001).

Approximately two-thirds of the Powder Basin is rangeland with livestock grazing as the primary land use. One-sixth of the Basin is forestland where timber harvest and summer livestock grazing are the main uses. Most of the remaining area is cropland and pastureland irrigated by gravity flood or sprinkler systems. Irrigated acres produce primarily grain, hay and pasture (Powder Basin Watershed Council 1996).

Most of the private land in Baker County is zoned “exclusive farm use” (EFU). Most of the remaining private land is zoned “timber-grazing”, 80% of which is used primarily for grazing. Less than 10% of the county is zoned in any other category (G. Young, personal communication).

Mineral mining is important in Baker County both historically and in the present. The effects of past dredge mining can be seen along stream courses throughout the Burnt River subbasin in the form of tailings that line the riparian areas. Currently, mining continues to be a significant land use in the county. Baker County presently has more patented mine claims than all other Oregon counties combined. Additionally, there are many, “maybe thousands”, of unpatented mineral claims in the county (G. Young, personal communication). Baker County is the only county in Oregon with a specific zoning category for “mineral extraction” (ME).

Impoundments and Irrigation Projects

The Burnt River subbasin includes numerous ditches both active and no longer in use. These ditches were constructed for use in mining and irrigation. The Eldorado Ditch, no longer in use, was once the longest ditch in Oregon and was constructed to feed mines in Malheur County. The Burnt river Irrigation District encompasses about 85% of the Burnt River subbasin. Within the District, there are 149 diversions from 48 identified sources. There are approximately 35 additional diversions in the subbasin but outside the District. It is not known how many of the historic ditches are still in use or how much water they carry. Pete Man’s Ditch carries water from the North Fork John Day River in the John Day subbasin into the Burnt subbasin at San Lou Flat. This out-of basin source provides supplemental irrigation water and water for mining claims in the North Fork Burnt River drainage.

The Burnt river subbasin contains numerous dams and impoundments. The largest of these is Unity Reservoir with a storage capacity of 50,000 acre-feet. The OWRD lists 13 dams with storage capacities of 10 acre-feet or more (Table 7). Many, smaller impoundments and ponds also serve as water storage for irrigation and livestock. There are no hydroelectric generating facilities in the Burnt River subbasin, although Symbiotics has

filed preliminary permit applications to study the feasibility of installing hydropower at Unity Dam and two Powder subbasin dams.

Table 7. Burnt River subbasin dams with storage capacities of 10 acre-feet or more

Name	Stream	Dam Height (ft)	Storage (Ac-ft)
Unnamed	Sisley Creek	10	15
Camp Creek Reservoir	Camp Creek & Bull Run Creek	45	1,700
Long Creek Reservoir	Long Creek	20	70
Moore Reservoir	Manning Creek	15	50
Morfitt Reservoir	Off-channel	20	280
Munn Reservoir	Middle Fork Burnt River	23	120
Murray Reservoir	East Camp & Camp Creek	21	467
Powell Creek Reservoir	Powell Creek	16	10
Ruddell Reservoir	Beaver Dam Creek	10	50
True Blue Reservoir No. 1	True Blue Creek	14	13
True Blue Reservoir No. 2	True Blue Creek	13	10
Unity Reservoir	Burnt River	67	50,000
Whited Reservoir	South Fork Burnt River	45	700

Protected Areas

US Forest Service

- *Monument Rock Wilderness Area.* Some of the streams that form the headwaters of the South Fork Burnt River lie within the Monument Rock Wilderness Area. At the southernmost edge of the Blue Mountains, this 19,620-acre wilderness with its alpine, once glaciated ridges offers views across much of northeast Oregon. Elevations of the wilderness range from 5,200 to 7,800 feet. Most recreational use of the wilderness is during hunting seasons.

US Bureau of Land Management

- *Oregon Trail Area of Critical Environmental Concern.* Seven parcels of public lands with remnants of the Oregon National Historic Trail, encompassing approximately 1,495 acres, are designated and will be managed as an ACEC to preserve the unique historic resource and visual qualities of these areas. These lands are located within both the Burnt and Powder River subbasins.
- *Unity Reservoir Bald Eagle Nest Habitat Area of Critical Environmental Concern.* Approximately 360 acres of BLM managed lands on the North Fork of the Burnt River will be managed to protect habitat consistent with the Endangered Species Act and Pacific States Bald Eagle Management Plan.

Fish and Wildlife Resources

Fish and Wildlife Status

Fish

The Burnt River subbasin once supported healthy runs of anadromous fish as well as a variety of resident fish species. W.M. Chapman reported (1940) that the principal spawning areas in the Burnt River subbasin were in the North and South Forks of the Burnt River. He indicates that the newly constructed Unity Dam (completed in 1936), with its lack of fish ladder, was “killing off the chinook (*Oncorhynchus tshawytscha*) and steelhead (*Oncorhynchus mykiss*) runs by keeping them from the spawning areas.” He reported that a substantial number of fish died at the dam in the spring of 1940 and that the local citizenry were very critical of this loss. Others described sizeable runs of salmon and steelhead in the Burnt River system and add the effects of gold dredging (Stout 1957, cited in Thompson and Haas 1960) and low flows resulting from irrigation diversions (Parkhurst 1950, cited in Thompson and Haas 1960) as causes of the depletion of Burnt River chinook runs.

After the construction of Unity Dam in 1936-1939, which excluded salmon and steelhead from the upper reaches of the Burnt River system, steelhead likely continued to use tributaries below the dam. Thompson and Haas (1960) mention an anecdotal account of a steelhead caught in Dixie Creek in about 1950. Access to even these lower streams by anadromous fish was cut off by the construction of the Hell’s Canyon Complex of dams on the Snake River below the Burnt River. Brownlee, the first of these dams, was completed in 1958, followed by Oxbow Dam in 1961 and Hells Canyon Dam in 1967. None of the Hell’s Canyon Complex dams provides for fish passage. Anadromous fish are presently absent from the Burnt River subbasin.

Although the Burnt River subbasin lacks anadromous fish, it does support diverse resident fish populations and an active recreational fishery. Resident fish include both native and introduced species (Table 8).

Bull trout (*Salvelinus confluentus*) are, apparently, absent from the Burnt River system. Recent surveys have failed to detect bull trout in the Burnt River or its tributaries and there is no known historic documentation of the species in the subbasin (J. Zakel, personal communication, August 2001; M. Hanson, personal communication, August

2001). However, bull trout are present in the Powder, John Day and Malheur river systems adjacent to the Burnt River on three sides.

The Hells Canyon Complex Recovery Unit (HCCRU) is comprised of the Snake River mainstem and tributaries in Oregon and Washington that drain to the Snake River within the Hells Canyon Hydroelectric Project (Hells Canyon, Oxbow, and Brownlee Dams and associated reservoirs). Two core areas were identified in the HCCRU, the Pine/Indian/Wildhorse Core Area consisting of the Pine Creek subbasin in Oregon and Indian and Wildhorse subbasins in Idaho. Chapter 1 of the Draft Bull Trout Recovery Plan (In Press) defines core areas as follows: The combination of core habitat (i.e., habitat that could supply all elements for the long-term security of bull trout) and a core population (i.e., bull trout inhabiting core habitat) of bull trout.

There are currently at least 7 local bull trout populations identified in this core area. The Powder Core Area encompasses the streams draining the Powder River and contains 10 or more local bull trout populations. Bull trout to date have not been identified in the Burnt River Basin, although they may have existed there historically. The Burnt River Basin is included in delineation of the recovery unit and is identified as a research need. Additional studies are needed to determine status of any remnant bull trout populations in the Burnt River Basin and it's habitat potential to recover and support bull trout.

Table 8. Fish species known to occur in the Burnt River subbasin

Species	Origin	Distribution
Redband trout (<i>Oncorhynchus mykiss gibbsi</i>)	N	Widespread
Rainbow trout (<i>Oncorhynchus mykiss</i>)	I	Widespread
White sturgeon (<i>Acipenser transmontanus</i>)	N	Rare at mouth of Burnt R.
Mountain whitefish (<i>Prosopium williamsoni</i>)	N	Mainstem
Brook trout (<i>Salvelinus fontinalis</i>)	I	Widespread
Mottled sculpin (<i>Cottus bairdi</i>)	N	mainstem and tributaries
Slimy sculpin (<i>Cottus cognatus</i>)	N	mainstem and tributaries
Torrent sculpin (<i>Cottus rhotheus</i>)	N	mainstem and tributaries
Shorthead sculpin (<i>Cottus confuses</i>)	N	mainstem and tributaries
Piaiute sculpin (<i>Cottus beldingi</i>)	N	mainstem and tributaries
Carp (<i>Cyprinus carpio</i>)	I	Low Gradient Streams
Northern pikeminnow (<i>Ptychocheilus oregonensis</i>)	N	Mainstem
Chiselmouth (<i>Acrocheilus alutaceus</i>)	N	Widespread
Peamouth (<i>Mylocheilus caurinus</i>)	N	Widespread
Longnose dace (<i>Rhinichthys cataractae dulcis</i>)	N	Widespread
Speckled dace (<i>Rhinichthys osculus</i>)	N	Widespread
Redside shiner (<i>Richardsonius balteatus balteatus</i>)	N	Widespread
Largescale sucker (<i>Catostomus macrocheilus</i>)	N	Widespread
Mountain sucker (<i>Catostomus platyrhynchus</i>)	N	Widespread
Bridgelip sucker (<i>Catostomus columbianus</i>)	N	Widespread
Black crappie (<i>Poxomis nigromaculatus</i>)	I	Lakes, Ponds, Low Gradient
White crappie (<i>Poxomis annularis</i>)	I	Lakes, Ponds, Low Gradient
Largemouth bass (<i>Micropterus salmoides</i>)	I	Lakes, Ponds, Low Gradient

Species	Origin	Distribution
Smallmouth bass (<i>Micropterus dolomieu</i>)	I	Lakes, Ponds, Low Gradient
Bluegill (<i>Lepomis macrochirus</i>)	I	Lakes, Ponds, Low Gradient
Pumpkinseed (<i>Lepomis gibbosus</i>)	I	Lakes, Ponds, Low Gradient
Warmouth (<i>Lepomis gulosus</i>)	I	Lakes, Ponds, Low Gradient
Yellow perch (<i>Perca flavescens</i>)	I	Lakes, Ponds, Low Gradient
Channel catfish (<i>Ictalurus punctatus</i>)	I	Lakes, Ponds, Low Gradient
Flathead catfish (<i>Pylodictis olivaris</i>)	I	Lakes, Ponds, Low Gradient
Brown bullhead (<i>Ameiurus nebulosus</i>)	I	Lakes, Ponds, Low Gradient

I=Introduced, N=Native

Redband Trout (*Oncorhynchus mykiss*)

Redband trout are listed as sensitive by the USFS and BLM. Many of the rainbow trout populations in the Snake River Basin, including the Burnt River subbasin, have been identified as inland “redband” type trout. Some taxonomists suggest that the resident form of *O. mykiss* in most of the Burnt subbasin is part of the inland Columbia basin redband trout group. Distribution of redband trout is widespread throughout the Burnt River subbasin.

Resident redband trout tolerate water temperatures from 56° F to 70° F. Redband trout mature between 1 and 5 years of age with most maturing at age 3. They spawn mainly in the spring although studies of other inland populations as well as field investigations indicate that redband trout spawn throughout the year where water conditions allow (ODFW 1993a).

Rainbow Trout (*Oncorhynchus mykiss*)

Hatchery rainbow trout have been used to enhance fishery opportunities and harvest in the Burnt River subbasin since the 1940’s. This stocking effort supported popular trout fisheries on subbasin streams and reservoirs. Historically, releases have consisted of fry, fingerling, and legal-size (6-10 in.) fish. Present stocking consists of legal, or “catchable,” fish in the South Fork Burnt River and Murray Reservoir and fingerlings in Unity, Higgins, and Long Creek reservoirs. Rainbow trout released in the Burnt subbasin are reared outside the basin, primarily at the Oak Springs hatchery near Maupin, Oregon and the Fall River Hatchery in the Deschutes basin.

Brook Trout (*Salvelinus fontinalis*)

Brook trout are native to the eastern United States and were introduced into the Burnt River subbasin in the 1920’s. This species of trout spawns in the fall and most mature at 3 years of age. They are usually short-lived; few wild fish live beyond 5 years of age. Brook trout are also slow growing and many populations are prone to stunting, especially in small headwater streams and lakes. Brook trout prefer cool, clear headwater streams and mountain lakes with water temperatures ranging from 55° F - 68° F.

Brook trout are found throughout the Burnt subbasin especially the South Fork Burnt River drainage. There is currently no stocking of brook trout in subbasin streams or lakes.

Wildlife

A variety of wildlife species are found in the riverine, wetland and upland habitats of the Burnt River subbasin. Nearly two-thirds of the wildlife species statewide are adaptable and thrive in both natural and human-impacted environments (e.g., coyote raccoon, red-tailed hawk, great horned owl, American robin, Brewer’s blackbird, dark-eyed junco). One third of the state’s wildlife species depend on natural or undisturbed environments. Over 20 federally listed species or species of concern can be found in the subbasin (Table 9).

Various populations of wildlife species are managed by federal and state wildlife managers throughout the subbasin, including big game, furbearers, upland birds, and waterfowl. Many raptor species (e.g., golden eagle, American kestrel, northern goshawk) inhabit the subbasin including several seasonal migrants (e.g., bald eagle, Swainson’s hawk).

The Burnt subbasin includes portions of the Sumpter, Lookout Mountain and Beulah Wildlife Management Units.

Table 9. Federally listed wildlife species and species of concern in the Burnt River subbasin. A * denotes species extirpated from the area or whose population status is unknown

Common Name	Scientific Name	Common Name	Scientific Name
tailed frog	<i>Ascaphus truei</i>	pygmy rabbit*	<i>Brachylagus idahoensis</i>
Columbia spotted frog	<i>Rana luteiventris</i>	gray wolf*	<i>Canis lupus</i>
northern sagebrush lizard	<i>Sceloporus graciosus</i>	pale western big-eared bat	<i>Corynorhinus townsendii</i>
northern goshawk	<i>Accipiter gentilis</i>	California wolverine*	<i>Gulo gulo</i>
western burrowing owl	<i>Athene cunicularia</i>	silver-haired bat	<i>Lasionycteris noctivagans</i>
ferruginous hawk	<i>Buteo regalis</i>	Canada lynx*	<i>Lynx canadensis</i>
western greater sage-grouse	<i>Centrocercus urophasianus</i>	Pacific fisher*	<i>Martes pennanti</i>
yellow-billed cuckoo	<i>Coccyzus americanus</i>	western small-footed myotis	<i>Myotis ciliolabrum</i>
eastern Oregon willow flycatcher	<i>Empidonax trailii</i>	long-eared myotis	<i>Myotis evotis</i>
Lewis’s woodpecker	<i>Melanerpes lewis</i>	fringed myotis	<i>Myotis thysanodes</i>
mountain quail	<i>Oreortyx pictus</i>	long-legged myotis	<i>Myotis volans</i>
white-headed woodpecker	<i>Picoides albolarvatus</i>	Yuma myotis	<i>Myotis yumanensis</i>
		Preble’s shrew	<i>Sorex preblei</i>

California Bighorn Sheep (*Ovis canadensis*)

California bighorn sheep were extirpated from Oregon by about 1915. Historical information suggests that bighorns in the Burnt River subbasin were eliminated by a combination of disease and overhunting. California bighorn sheep were reintroduced to the Burnt River subbasin in 1987. About 70 California bighorn sheep currently occupy the

Burnt River Canyon. Current management of Oregon's bighorn sheep is described in the Bighorn Sheep Plan (ODFW 1992a).

Rocky Mountain Elk (*Cervus elaphus nelsoni*)

Rocky Mountain elk are found throughout the subbasin wherever forage and cover can be found. Rocky Mountain elk have historically been more abundant in the Blue and Willowa mountains than elsewhere in Oregon. Routine surveys have shown a slow decline in calf recruitment in the area over the past several years but to a much lesser degree than that experienced in Willowa and, more recently, Union counties (G. Keister, ODFW, personal communication, August 2001).

Quality, quantity and arrangement of several habitat components affect the distribution of elk. Availability and juxtaposition of food, water, shelter, space and harassment due to human activities ultimately determine the number of elk an area can sustain and the amount of recreation that can be provided. Migratory herds need high quality forage on transitional winter and summer ranges. Resident herds must find sources of quality forage within their herd range.

During summer, elk prefer damp sites such as meadows and riparian areas, which offer nutritious forage and moist, cool places for escaping summer heat and insects. Winter survival is primarily dependent on fat stores. Thus, quality summer forage is at least as important as adequate winter food for over-winter survival. Elk require a mosaic of early forage-producing stages and later cover-forming stages of forest development; both in close proximity. In the Burnt subbasin, many summer ranges for elk are on public land in the upper drainages, whereas winter ranges are largely on, or adjacent to, private lands. However, during the late summer (August and September) as natural elk forage dries and becomes less palatable, irrigated alfalfa fields attract herds of foraging elk. The resulting movement onto private lands creates significant conflict with landowners who may suffer serious financial losses.

Most elk that summer in the upper Burnt River subbasin, winter in the John Day drainage to the west. However, there has been a recent (last 15 to 20 years) shift of large numbers of elk to the south to areas that are mostly private rangelands, creating an increase in conflicts as the animals move into alfalfa fields at night and are hesitant to leave. Elk breed in the fall, generally in September and October. Adult cows in good condition will typically produce a calf each year. Most young are born in June.

Management of elk in eastern Oregon is guided by the Rocky Mountain Elk Plan (ODFW 1992b). The plan was developed through a public review process and identifies management objectives for population numbers and bull ratios with management options for each wildlife management unit.

Mule Deer (*Odocoileus hemionus*)

Rocky Mountain mule deer are native to eastern Oregon and are distributed throughout the Burnt River subbasin. Mule deer populations in the subbasin experienced dramatic declines in the early 1980's after a series of harsh winters. Extreme drought 1986-1992 with hard winters 1988/89 and 1992/93 also reduced populations. Since then slow, moderate increases have been noted due to a series of easy winters (G. Keister, personal communication, August 2001). Some areas of the subbasin, such as the Burnt River Valley, have high concentrations of wintering mule deer. Oregon management strategies

regarding mule deer were developed through a public review process and are identified in the Mule Deer Plan (ODFW 1990).

Mule deer occupy a wide range of habitat types including desert shrub, woodland, conifer forest and alpine areas. In general, however, mule deer occupy more open, rugged areas. Although mule deer are commonly thought to be browsers, they consume a wide variety of plant material and in some seasons, graze extensively. Winter weather and deep snow drive mule deer to lower elevation wintering grounds. During this critical period for survival, mule deer typically browse the new growth of trees and shrubs. During spring, mule deer depend on succulent forbs and grasses that appear following snow-melt.

White-tailed Deer (*Odocoileus virginianus ochrourus*)

Northeast Oregon harbors the highest densities in the state of this subspecies, often called the Idaho white-tail. In the Burnt River subbasin, white-tail deer are infrequently seen. White-tailed deer utilize heavy shrub patches and thick riparian vegetation and are gradually extending their range as these features become more available. Because of their preference for heavy cover and their more limited distribution, white-tailed deer are seen less often than mule deer by both wildlife watchers and hunters.

Cougar (*Puma concolor*)

Cougars were classified in Oregon as an unprotected predator until 1978. Under that classification, and with the encouragement of bounties, the population reached an estimated low of 200 animals statewide. Following their classification as a game mammal in 1978, populations have increased steadily. In 1992, ODFW estimated the statewide population to be growing at a rate of 4-5% per year, a trend that likely continues today (ODFW 1993b) given their high reproductive potential. Oregon cougar populations are managed through the Cougar Plan (ODFW 1993b).

In the Burnt River subbasin, significant increases in cougar harvest and increasing cougar damage complaints indicate an increase in cougar populations since 1995.

Cougars may breed at any time of the year and give birth to an average of 3 young. The young stay with the female for 12-18 months before becoming independent. Female young may remain close to their natal home range while males generally disperse relatively long distances. Adult females typically breed again shortly after their young disperse although they may breed prior to that time.

Cougars are a significant predator of deer and elk and may also prey on domestic animals. Cougar predation can impact small, isolated ungulate populations (Ross et al. 1997) and limit recruitment in larger populations. This may have an impact on achievement of management objectives for big game herds.

Canada Lynx (*Lynx canadensis*)

The Canada lynx was federally listed as threatened in 2000. Potentially suitable habitat in the Burnt subbasin includes those plant communities above 4,500 feet in elevation that support vegetation capable of providing denning, foraging or travel habitat for lynx. Lower elevations are not considered potentially suitable for lynx denning and foraging because the primary prey species (snowshoe hare) does not inhabit those elevations in sufficient numbers. Lynx require stands with structural diversity and large woody debris in close proximity to foraging areas for denning. Hair-snag surveys for Canada lynx were

conducted by the USFWS and the USFS in the subbasin in 1999 and 2000. These surveys failed to detect lynx in the area.

American Marten (*Martes americana*)

American martens are native to the mountainous regions of Oregon including the mountains of the Burnt river subbasin. They are closely associated with late-successional conifer forests and riparian habitats over a broad range of elevations (Buskirk and Ruggiero 1994, Csuti et al. 1997, Wisdom et al. 2000, Sallabanks et al. 2001). Marten populations may be declining due to loss of preferred late successional forest habitat (Csuti et al. 1997). Martens are sensitive to patch size and generally avoid clearcuts, preferring habitats with woody structural diversity including large diameter snags and logs (Wisdom et al. 2000). American marten are classified as a furbearer in Oregon and thus, can be legally harvested by trappers.

Black Bear (*Ursus americanus*)

The black bear is an important part of the ecosystem and has been considered an indicator of ecosystem health (ODFW 1993c). Black bear populations in the subbasin are steadily increasing and bears can be found in most forested habitats. Recent rules restricting the use of baiting and pursuit hounds have reduced hunting pressure; harvest is mostly opportunistic during other big game seasons. Bailey (1936a) estimated Oregon's 1930-1933 bear population at approximately 9,000 animals. The 1993 population was estimated at 25,000 based on an estimated density of 0.3 bears per mi² of suitable habitat in eastern Oregon (ODFW 1993c). Black bears are managed according to the Black Bear Management Plan (ODFW 1993c).

Black bear diets are very diverse, but because of winter hibernation, forage availability in spring and fall is critical to survival. Bears can be a significant predator of deer fawns and elk calves. Black bear reproductive potential is relatively high with 2 cubs per litter most common. Young generally remain with the female for more than one year and disperse as yearlings in the spring when females breed again. Bears are long-lived animals; individuals older than 20 years have been documented in Oregon (ODFW 2000a).

Furbearers

Wetland/Riparian furbearers: Several species of wetland/riparian dependant furbearers including beaver (*Castor canadensis*), river otter (*Lutra canadensis*), mink (*Mustela vison*), muskrat (*Ondatra zibethicus*), and raccoon (*Procyon lotor*) are found in the Burnt subbasin.

Beavers were historically abundant throughout Oregon (Bailey 1936b) so that early trappers returned with a wealth of pelts. Beavers perform an important function in creating wetland habitat. Over time, their labors result in a mosaic of wetland successional stages from open-water ponds to seasonal wet meadows. Beavers' efficiency at aquatic engineering has resulted in conflicts with humans when irrigation projects are rerouted, fields are flooded, fences are damaged by falling trees or other damage is done to human developments. Beaver populations are relatively low on many National Forest lands of the Burnt subbasin due primarily to poor riparian condition. In the Burnt subbasin, beaver damage to irrigation ditches is common in basins and streams near agricultural areas (G.

Keister, personal communication, Sept. 2001). Beavers are classified as furbearers in Oregon and are subject to trapping.

River otters are relatively common along the mainstem rivers and tributaries of the Burnt River subbasin. Otters consume many aquatic organisms including fish, frogs, and turtles as well as small mammals, birds and carrion.

Mink are also relatively common in the subbasin's wetland and riparian areas. They are semi-aquatic animals with partially webbed feet for swimming. Mink prey primarily on muskrats but will also consume fish, frogs, crawfish, small mammals and birds found near water.

Muskrats are found in or near water throughout the Burnt River subbasin. In appropriate habitats, population densities can reach 1-4 per acre of surface water (Csuti et al. 1997). Muskrats eat primarily aquatic and wetland vegetation but will also prey on small aquatic animals. Muskrats build large nests of vegetation and mud or den in banks, but generally do not create the kind of alterations that put beavers in conflict with humans.

Raccoons are versatile omnivores that occur in a wide variety of habitats. When food is abundant, raccoons are selective in their diet, but when food becomes scarce, they will eat almost anything (Csuti et al. 1997). Their adaptability and catholic diet often put raccoons in conflict with humans as they forage among domestic pets, fowl, and pet food. Raccoons are largely nocturnal and spend the daylight hours in trees.

Furbearers of Conservation Concern: The fisher (*Martes pennanti*) and wolverine (*Gulo gulo*) are furbearers classified by the Natural Heritage system as sensitive in Oregon (Bull and Wales in press).

Fishers are very rare in Oregon with most sightings in the Coast and Cascade Mountains. The species is being considered for listing by the U.S. Fish and Wildlife Service because populations are very low. A few individuals may reside in the Elkhorn Mountains of the Burnt River subbasin although their abundance and distribution is unknown. Fishers primarily use mature, closed-canopy forests with some deciduous component, frequently along riparian corridors. Although fishers will cross openings between forested areas (Arthur et al. 1989), a negative association with clearcuts has been documented.

Wolverines were historically found throughout Oregon in appropriate habitats. The species is very rare and is considered a Species of Concern by the U.S. Fish and Wildlife Service. Wolverine sightings are occasionally reported in the Blue Mountains but their abundance and distribution in the area is unknown. Wolverines are typically found in open forests at higher elevations and in alpine areas. They avoid young, dense, regenerating forests and brushy areas (Csuti et al. 1997).

Wading and Shore Birds

A number of wading and shore birds are found in the Burnt subbasin (e.g.: spotted sandpiper, killdeer, American avocet, long-billed curlew), but 2 species merit special note: the great blue heron (*Ardea herodias*) and the sandhill crane (*Grus canadensis*).

Great blue herons are colony-nesting birds that forage in shallow wetlands, irrigated fields or moving waters. They can be found throughout the subbasin along lower elevation streams and wetlands. Most heron rookeries are found in mature cottonwood galleries along riparian areas. Human induced changes to rivers and wetlands (dredging, diking,

stream channelization, mining, cattle grazing) have substantially reduced riparian associated wetlands historically created by beaver dams and seasonal flooding. This loss of riparian wetland has resulted in the loss of some of the old cottonwood galleries and limited their replacement. Loss of roosting and foraging habitat likely has a negative effect on great blue heron populations.

Sandhill cranes are listed as “vulnerable” in Oregon. There are estimated to be about 1,000 nesting pairs in the state (Csuti et al. 1997). A few nesting pairs may be found in the Burnt River subbasin. Sandhill cranes typically nest in marshes and wet meadows or in drier grasslands and pastures. The young of dry land nesters are vulnerable when hayfields and pastures are mowed early in the season. The loss of wetland and wet meadow habitats to agriculture and development has resulted in a decrease in safe nesting areas for sandhill cranes.

Waterfowl

Twenty species of ducks, four species of geese, and two species of swans occur in the Burnt River subbasin during migration and nesting seasons (Table 10). Historically, beaver dams and seasonal flooding provided more ponds and open, slow moving waters for waterfowl resting, nesting, and feeding. Diking and channelization for flood control and intensive agriculture have eliminated many wetlands.

Table 10. List of common waterfowl species in the Burnt River subbasin

Common Name	Scientific Name	Common Name	Scientific Name
Tundra swan	<i>Cygnus columbianus</i>	Ruddy duck	<i>Oxyura jamaicensis</i>
Trumpeter swan	<i>Cygnus buccinator</i>	Cinnamon teal	<i>Anas cyanoptera</i>
Greater white-fronted goose	<i>Anser albifrons</i>	Northern shoveler	<i>Anas clypeata</i>
Snow goose	<i>Chen caerulescens</i>	Gadwall	<i>Anas strpera</i>
Ross’ goose	<i>Chen rossii</i>	Eurasian wigeon	<i>Anas Penelope</i>
Canada goose	<i>Branta canadensis</i>	American wigeon	<i>Anas americana</i>
Wood duck	<i>Aix sponsa</i>	Canvasback	<i>Aythya valisineria</i>
Green-winged teal	<i>Anas crecca</i>	Redhead	<i>Aythya americana</i>
Mallard	<i>Anas platyrhynchos</i>	Ring-necked duck	<i>Aythya collaris</i>
Northern pintail	<i>Anas acuta</i>	Lesser scaup	<i>Aythya affinis</i>
Blue-winged teal	<i>Anas doscours</i>	Common goldeneye	<i>Bucephala cllangula</i>
Hooded merganser	<i>Lophodytes cucullatus</i>	Barrow’s goldeneye	<i>Bucephala islandica</i>
Common merganser	<i>Mergus merganser</i>	Bufflehead	<i>Bucephala albeola</i>

Upland Game Birds

Chukar, pheasant, Hungarian partridge, and wild turkey are not native to the Burnt subbasin but they are some of the most popular species among bird hunters (Table 11).

In general, mountain quail have declined throughout most of their range and valley quail have increased in suitable habitats. Mountain quail in eastern Oregon are dependent on brushy and diverse riparian habitat and populations have disappeared as these habitats have deteriorated (ODFW 1998). Increased sightings in northeast Oregon in recent years

suggest a slight recovery in response to moderate winters, riparian improvements and the end of an extensive drought cycle.

Table 11. Upland birds in the Burnt River subbasin

Common Name	Scientific Name	Common Name	Scientific Name
Chukar partridge	<i>Alectoris chukar</i>	Wild turkey	<i>Meleagris galopavo</i>
Mountain quail	<i>Oreortyx pictus</i>	Ruffed grouse	<i>Bonasa umbellus</i>
Blue grouse	<i>Dendragapus obscurus</i>	Ring-necked pheasant	<i>Phasianus colchius</i>
Hungarian partridge	<i>Perdix perdix</i>	Sage grouse	<i>Centrocercus urophasianus</i>
California valley quail	<i>Calipepla californica</i>	Columbian sharp-tailed grouse	<i>Tympanuchus phasianellus columbianus</i>

bold = federal species of concern

Mountain Quail

Mountain quail are native to the Blue Mountains and prefer open forests and woodlands with a shrub understory (Csuti et al. 1997). They will also utilize riparian woodlands. The population in northeast Oregon has declined recently; they are now considered “very uncommon” in the area (M. Henjum, ODFW, personal communication). The loss of low-elevation, open Ponderosa pine forests and riparian habitats has likely contributed to the decline of this species.

Sage Grouse

Sage Grouse are native to the arid regions of eastern Oregon. The species is found only in areas dominated by big sagebrush and prefers those areas where habitat is 60% or more sagebrush with cover of 15% to 25% (Csuti et al. 1997; G. Keister, personal communication). Males congregate in large numbers in more open areas (leks) for courtship display. Throughout the range, loss of habitat to wildfires and conversion to agriculture has been the primary factor contributing to the decline of this species since the early 1900’s (Willis et al. 1993).

There are more than 50 sage grouse leks in Baker County but there is a continued threat of loss of habitat to wildfire, development and agriculture.

Bald Eagle (*Haliaeetus leucocephalus*)

Bald eagles are generally winter visitors to the Burnt River subbasin although one nest has been documented in the subbasin. Roost trees are primarily cottonwoods in agricultural areas or large conifers in forested areas and near ponds and lakes. Loss and degradation of deciduous riparian habitats may severely limit opportunities for roosting and nesting by bald eagles although some forested roost habitat is relatively close to food sources. Bald eagles are federally listed as Threatened, but are proposed for de-listing. They are protected by the Migratory Bird Treaty Act.

Threatened, Endangered, and Sensitive Species

Although the status of wildlife species and populations varies throughout the subbasin, several wildlife species within the subbasin are listed as federal and/or state Threatened, Endangered, and Sensitive or Species of Concern (Table 9).

Some species have naturally low, localized populations such as the bobolink. Swainson's hawks have declined in much of their range largely due to environmental problems in their southern hemisphere wintering grounds although numbers of this species may be increasing in the Burnt subbasin (G. Keister, personal communication). Habitat alteration and conversion are believed responsible for the sensitive status of many species.

The ferruginous hawk, burrowing owl, white-tailed jackrabbit, and grasshopper sparrow are dependent on grassland and shrub communities, which have been extensively converted to agriculture and altered by grazing.

Many forest-dependent species can be affected by timber harvest and management practices (Bull and Wales, in press). Removal of standing and down dead trees may eliminate foraging and nesting sites for some woodpeckers. The loss of nest or roost trees could be detrimental to bald eagles, goshawks or ferruginous hawks, while the loss of canopy cover may be detrimental to goshawks or to the prey of some raptors (Bull and Wales, in press). The more open canopies created by thinning may benefit some species and harm others.

Several target species have been selected for use in Habitat Evaluation Procedures (HEP) through the loss assessment and mitigation crediting process [(Rasmussen and Wright 1990a, b, c, d) Table 12]. These target species and their habitats are considered for habitat mitigation throughout the Columbia Basin.

Table 12. Target species selected for the Lower Snake River Project and used in Habitat Evaluation Procedures

Target Species Selected for the Lower Snake River Project HEP and the Rationale for Their Selection (Sather-Blair et al. 1991)	
EVALUATION SPECIES	RATIONALE FOR SELECTION
Downy woodpecker (<i>Picoides pubescens</i>)	Indicator species for riparian forest
Yellow warbler (<i>Dendroica petechia</i>)	Indicator species for scrub-shrub wetlands
Marsh wren (<i>Cistothorus palustris</i>)	Indicator species for emergent wetlands
Song sparrow (<i>Melospiza melodia</i>)	Indicator species for mesic shrubland and riparian forest shrub understory
Western meadowlark (<i>Stumella neglecta</i>)	Indicator species for grass / shrub-steppe
River otter (<i>Lutra canadensis</i>)	Indicator furbearer species
Mule deer (<i>Odocoileus hemionus</i>)	Important big game species
California quail (<i>Callipepla californica</i>)	Important upland game bird
Ring-necked pheasant (<i>Phasianus colchicus</i>)	Important upland game bird
Chukar (<i>Alectoris chukar</i>)	Important upland game bird
Mallard (<i>Anas platyrhynchos</i>)	Indicator species for waterfowl habitat associated with backwater / ponded areas
Canada goose (<i>Branta canadensis</i>)	Indicator waterfowl species for river and reservoir system

Habitat Areas and Quality

Habitat degradation and destruction are ranked as the most pervasive threat to biodiversity in the United States (Wilcove et al. 2000). Biodiversity in the Burnt River subbasin is similarly threatened by loss and alteration of habitats. Wisdom et al. (2000) concluded that low-elevation old-forest habitats in the interior Columbia Basin had suffered the greatest decline over time. Low-elevation late seral forests serve as the interface between forested and non-forested habitats. Riparian areas in the Burnt subbasin have suffered major, lasting degradation due to the effects of mining. Riparian habitats serve as the interface between aquatic and terrestrial species and have a direct effect on in-stream habitat features such as temperature, stability, and sediment. Riparian areas also serve as a source of woody debris in streams and other water bodies as well as food and nutrient input (e.g., insect and leaf litter drop). Thus, the condition of terrestrial habitats is tied to the health of aquatic ecosystems. Likewise, the condition of aquatic habitats is tied to the health of terrestrial ecosystems through the “food web that knits the water and land together” (Cederholm et al. 2001).

Extensive vegetation removal and disturbance associated with rural development, forestry, transportation corridors, flood control, mining and agriculture has occurred and continues in the Burnt River subbasin (Oregon Progress Board 2000). This has resulted in habitats that are very different in both quantity and quality from those present before European settlement.

The Powder Basin Watershed Council (1996, p.12) described some of the habitat effects of past development activity in the Powder River Basin including the Burnt River subbasin:

Major watershed problems began to appear in some areas in the late 1800’s when riparian and upland ranges were overgrazed, when considerable flow amounts were diverted from streams for irrigated agriculture, and when stream channels and floodplains were placer mined. Serious runoff/erosion problems and flooding developed in main areas. Stream channels in many areas severely down cut, with loss of water table and conversion of riparian vegetation to dryland species. Overgrazing of riparian areas led to severe reduction of riparian vegetation and increased streambank erosion, with adverse effects on fish and wildlife. Stream diversions and placer mining further impacted anadromous and resident fish migrations and habitat.

A new round of watershed impacts began in the 1890’s with the advent of railroads and clear-cut logging of floodplains and uplands. This was followed by large-scale placer mining with boat-like dredges in the upper Powder River watershed. From the 1890’s to the 1970’s, several large reservoirs were constructed throughout the basin, and additional stream diversions were made for irrigated agriculture. From the 1950’s into the 1990’s, many roads were constructed into public and private forestlands, and large volumes of timber were harvested. During this same time period, many streams were placer mined for the second or third time.

Fish

The most dramatic and visible habitat alteration from past land use practices is the transformation of riparian areas and stream channels to expanses of dredge tailings. Dredge deposits are especially evident along the Whitney area of the North Fork Burnt River. Streamflow in several creeks in the North Fork Burnt River drainage goes subsurface because of streambed disruption and substrate aggradation (Wallowa Whitman National Forest 1995).

Placer and hydraulic mining operations of the late 1800's required large quantities of water. Long ditches such as the Pete Mann were constructed to divert the needed water to mining areas. Water is naturally scarce in most of these upland regions and mining operations as well as waste diversions had significant impact on streams and riparian systems. Source streams were often depleted of sufficient water to maintain the historic level of riparian vegetation for a considerable distance downstream of the diversion point. Hydraulic mining pots and scars and dewatered stream channels can still be found in many localities (Wallowa Whitman National Forest 1995).

In addition to loss of riparian vegetation and natural stream structure, mining has left a legacy of increased sediment in area streams. This has resulted in the filling of pool habitat and the overall aggradation of stream channels, resulting in less salmonid rearing and spawning habitat (Wallowa Whitman National Forest 1999b).

Some sediment discharge is a natural and beneficial function of streams, providing for channel maintenance and floodplain productivity. Reservoirs constructed in the stream channel serve as settling ponds, removing sediments from the stream system and disrupting these functions in stream reaches downstream of the reservoirs (Powder Basin Watershed Council 2001, C. Fagan, ODFW Northeast Region Hydropower Coordinator, personal communication, Sept. 2001).

Fish passage barriers at large reservoirs and smaller irrigation diversions limit access to habitats for seasonal migration or dispersal. Passage barriers created by low flows and high temperatures also limit available habitat and movement of fish to alternate habitat areas and refugia.

Hutchison and Fortune (1967) compiled a list of stream areas of greatest importance in the Powder River Basin for fish production and angling. In the Burnt River subbasin, these include:

- South Fork Burnt River
- North Fork Burnt River

“Other stream areas have substantial habitat potential,” according to the report, “but the present lack of acceptable flows prevent existence of desirable fish life” (p. 8).

Wildlife

Humphreys and West (1980) discuss sensitive habitats for a variety of wildlife species in Baker County. Although noting that habitats for upland game birds are difficult to identify due to the diversity of habitat requirements among this group of species, they offer the following sensitive habitats:

- Riparian zone along all water courses
- Brushy cover associated with wet meadows or woodlots

- Sagebrush land in draws that are untillable for farming
- Cover associated with irrigation ditches
- Brushy roadside cover and fencerow cover

Forest and agricultural areas can offer quality habitats for upland birds, especially when edge and border areas are left uncleared. Urban and industrial development and road construction that take these areas out of production can negatively affect upland bird populations and habitats (Humphreys and West 1980).

The most sensitive habitat areas for big game are those areas used as winter range by deer and elk. These are gentle, south-facing slopes in forested areas and grassy low elevation areas such as the Burnt River Valley (Humphreys and West 1980). Much of the Burent subbasin serves as either summer or winter range for deer and elk (Figure 3). Low elevation winter range is often in close proximity to agricultural areas, which can create conflicts with landowners.

The Burnt River subbasin includes a variety of habitat categories. The ODFW has compiled data on the area of given habitat types by county and WMU. Table 13 illustrates the availability of those habitat categories in Baker County.

Table 13. Habitat categories and area in Baker County, Oregon (ODFW, unpublished data)

Habitat Category	Area in Acres	Area in Square Miles	Percent of County
Riparian	19,218	30	1%
Wetlands	2,625	4	0%
Grassland	301,137	471	16%
Juniper	35,840	56	2%
Sagebrush Steppe	598,390	935	33%
Mixed Conifer	413,920	647	23%
Pine	242,108	378	13%
Hardwoods	22,998	36	1%
Agriculture	196,140	306	11%

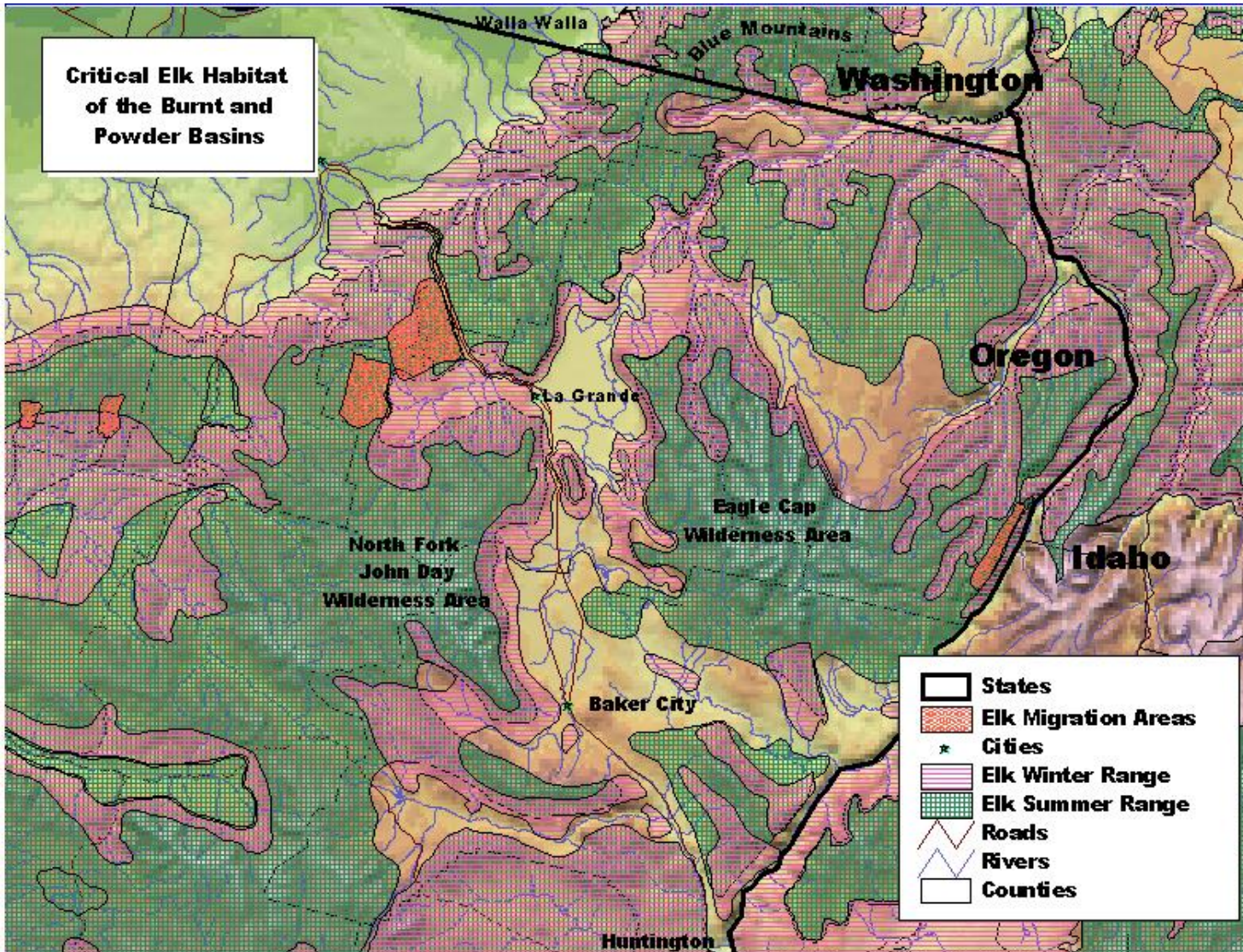


Figure 3. Critical elk habitat in northeast Oregon including the Burnt River subbasin (Rocky Mountain Elk Foundation)

Watershed Assessment

- Streamflow Restoration Prioritization – ODFW and OWRD have established priorities for restoration of streamflow from consumptive users, as part of the Oregon Plan for Salmon and Watersheds (Measure IV.A.8). ODFW has identified the “need” for streamflow restoration through ranking of biological and physical factors, water use patterns and the extent to which water is a primary limiting factor (Figure 4). OWRD ranked the opportunities and likelihood for achieving meaningful streamflow restoration. Rankings were performed for subwatersheds at approximately the fifth field hydrologic units (HUCs). OWRD Watermasters will incorporate the priorities into their field work activities as a means to implement flow restoration measures. The “needs” priorities will be used by the Oregon Watershed Enhancement Board as one criterion in determining funding priorities for enhancement and restoration projects. Watershed councils and other entities may also use the needs priorities as one piece of information determining high priority restoration projects.

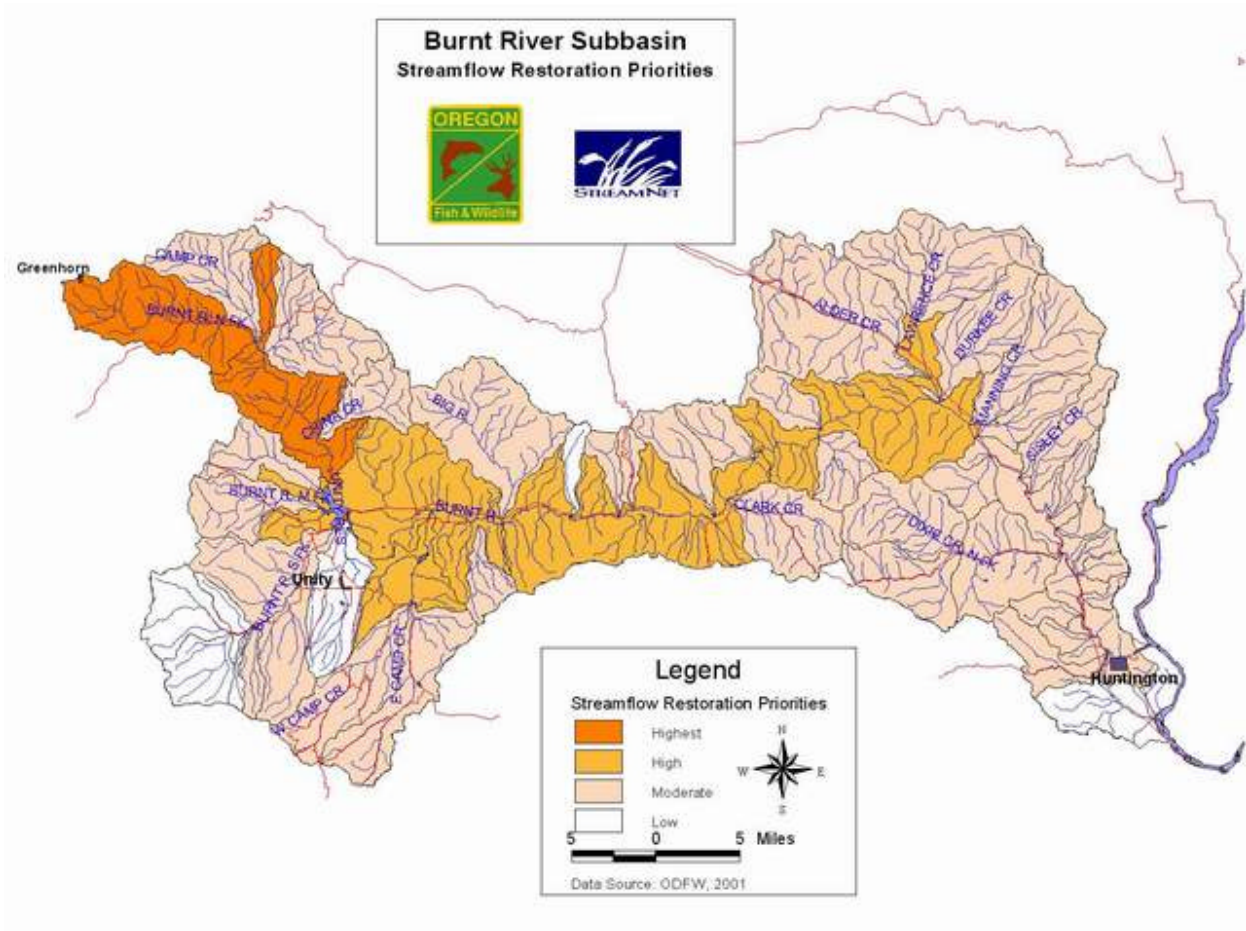


Figure 4. Streamflow restoration priorities in the Burnt River subbasin

- The US Forest Service has conducted watershed analyses in the North and South Forks of the Burnt River:
 - **North Fork Burnt River Watershed Analysis Report.** Wallowa Whitman National Forest, July 1995. This analysis provides a description of the dominant physical, biological, and human dimension features, characteristics and uses of the North Fork Burnt River watershed that assess ecosystem function and condition. The assessment also provides a framework to manage upland and riparian landscapes, analyze cumulative effects, and guide planning, management, restoration, and monitoring activities.
 - **South Fork Burnt River Watershed Analysis.** Wallowa Whitman National Forest, Unity Ranger District, November 1999. This analysis provides a description of the dominant physical, biological, and human dimension features, characteristics and uses of the South Fork Burnt River watershed that assess ecosystem function and condition. The assessment also provides a framework to manage upland and riparian landscapes, analyze cumulative effects, and guide planning, management, restoration, and monitoring activities.
 - **North Fork Burnt River Basin Stream Survey Report.** Wallowa Whitman National Forest, Unity Ranger District, February 1990. This report documents stream survey results in the North Fork Burnt River watershed including aquatic and riparian habitat information.
- **Burnt River Basin Water Temperature Modeling Study,** Draft Final Report. Prepared for the USDI Bureau of Reclamation by Kenneth A. Mangelson Water Quality and Land Suitability Group. The Burnt River Temperature Modeling Study report was prepared within the framework of the Burnt River Temperature Steering Committee to assist in development of a water quality management plan for agricultural activities within the Burnt River subbasin.
- **Preliminary Watershed Assessment for the Powder Basin Drainage.** Powder Basin Watershed Council 1996. This assessment provides information on the physical, biological and political characteristics of the Powder River Basin including the Burnt River and Pine Creek.
- **Powder Basin 1995/ 1996 Water Quality Monitoring – Baseline Data, Preliminary Results.** Baker Valley, Burnt River, Eagle Valley, & Keating Soil and Water Conservation Districts 1996. This document reports water quality monitoring results in the Powder River Basin including the Burnt River and Pine Creek.
- **Basin Investigations – Powder Basin.** Oregon State Game Commission (Hutchison and Fortune 1967). This document provides an assessment of the fish and wildlife resources of the Powder River Basin, including the Burnt River and Pine Creek, and their water requirements.
- The **Oregon Natural Heritage Program** maintains a database on habitats and species occurrences throughout the State of Oregon (ONHP 2001).
- **Streamflow Restoration Prioritization** – ODFW and OWRD have established priorities for restoration of streamflow from consumptive uses as part of the Oregon Plan for Salmon and Watersheds (Measure IV.A.8). ODFW has identified the “need” for streamflow restoration through ranking of biological and physical

factors, water use patterns and the extent to which flow is a primary limiting factor. The OWRD ranked the opportunities and likelihood for achieving meaningful streamflow restoration. Rankings were performed for subwatersheds at approximately the fifth field hydrologic units (HUCs). OWRD Watermasters will incorporate the priorities into their fieldwork activities as a means to implement flow restoration measures. The “needs” priorities will be used by the Oregon Watershed Enhancement Board as one criterion in determining funding priorities for enhancement and restoration projects. Watershed councils and other entities may also use the needs priorities as one piece of information determining high priority restoration projects.

- **Interior Columbia Basin Ecosystem Management Project (ICBEMP)** – Initiated by the Forest Service and Bureau of Land Management to respond to several critical issues in the interior Columbia Basin, including forest and rangeland health, anadromous fish concerns, and terrestrial species concerns, provides a comprehensive assessment for USFS and BLM-administered lands in Oregon (USDA and USDI 2000). Several assessments derived from this project and conducted by the Project’s Science Integration Team include *Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad-scale Trends and Management Implications* (Wisdom, et al 1998), *An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins* (Quigley and Arbelbide 1997), and *An Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin and Portions of the Klamath and Great Basins* (Quigley et al. 1996). These assessments characterize historical and current conditions and associated trends, and document accelerated changes in vegetation patterns, fish and wildlife distributions, and terrestrial and aquatic ecosystem processes that have occurred in the past century.
- The Northwest Power Planning Council documented changed conditions within the Columbia Basin hydropower system in its *Return to the River* report (NWPPC 1996).
- The Oregon Department of Environmental Quality and the Natural Resource Conservation Service initiated a process to develop a **Unified Watershed Assessment** (UWA) as part of the federal Clean Water Action Plan (CWAP) put forth by the USDA and EPA. Using existing assessment information, public input, and Tribal, Federal, and State participation, the 1998 Unified Watershed Assessment and Restoration Priorities for Oregon assessed the condition of water resources and prioritized watersheds for restoration. (www.deq.state.or.us). The Assessment is intended to identify potential opportunities to link the Oregon Plan, Tribal restoration plans, Federal plans, and other collaborative watershed assessment and restoration efforts.
- In association with the UWA effort, the Division of State Lands (DSL) produced a **Watershed Assessment Report** (ODSL 1998) that prioritized subbasins based on the greatest natural resource value, the least impact to condition, and the greatest risk to condition. These three categories of criteria were used to establish priority

rankings for subbasins that could benefit most from a watershed management or restoration approach.

- The DEQ has also inventoried state waters for listing through the Oregon DEQ's Clean Water Act **Section 303(d)**.
- The Inter-tribal **Wy-Kan-Ush Mi-Wa-Kish-Wit** (Spirit of the Salmon) restoration plan (CRITFC 1995) provides a foundation for meeting Tribal treaty and trust obligations in the Columbia River basin. The long-term plan also addresses the causes of anadromous fish declines, provides information on fish stock status and habitat, and makes recommendations to protect and restore declining fish populations.
- **Thompson and Haas** (1960) surveyed watersheds in the Burnt Subbasin for habitat condition, quantity, and quality for salmon and steelhead. They also reviewed potential hatchery sites.
- **Parkhurst** (1950) surveyed watersheds in the Burnt Subbasin and reported on habitat conditions for salmon and steelhead.
- **Chapman** (1940) reported on the presence of salmon and steelhead in various streams in the Burnt Subbasin.

Limiting Factors

As discussed elsewhere in this document, anadromous fish are presently absent from the Burnt River subbasin. However, they were present historically and, through the relicensing process for the Hells Canyon Complex dams, discussions are underway to determine the feasibility of reintroduction of salmon and steelhead to historic habitats above those dams. Therefore, the discussion that follows includes limiting factors that affect wildlife and both resident fish species currently in the subbasin and anadromous species that may, in the future, be reintroduced.

The Burnt River subbasin is an example of the sensitivity of watersheds in the interior Columbia Basin to human activity. Loss of quality habitat and a loss of connectedness are the over-riding limiting factors to fish and wildlife production in the Burnt subbasin (NWPPC 1995, Wisdom et al. 2000). Because salmon, steelhead and some trout are migratory fish to varying degrees, intact and healthy habitat is required throughout their life cycle range for healthy populations to exist. For wildlife, habitat loss has restricted the range of many species through fragmentation and isolation, and altered species communities. Furthermore, both migratory fish and wildlife have limiting factors outside the subbasin. For example, neotropical birds need good overwintering habitat; anadromous fish need good passage conditions and estuary rearing habitat.

Two key physical concerns form the context for the analysis of habitat conditions, the limiting factors for fish and wildlife resources, and ultimately the restoration recommendations for the Burnt subbasin. First, historic, recent and current land use practices have altered the hydrologic cycle – the storage, movement, and character of the water resource over entire areas of the Burnt subbasin. Generally, changes in the hydrologic cycle are demonstrated by excessive runoff, altered peak flow regimes, lack of ground water recharge, reduction in soil moisture storage, and low late-season flow. Second, historic and current land uses, in combination with hydrologic changes, have resulted in some portions of the Burnt subbasin reflecting marked stream channel

instability (i.e., channel widening, downcutting, vertical cut banks, and excessive gully development). Each of the limiting factors specifically within the subbasin and highlighted in this report is related in part to the broad-scale problems of hydrology and basin-wide stream channel instability. The actual causes of these conditions in the Burnt subbasin are multiple; therefore, the restoration of stream flows and stream channel stability will require combined action across many land uses and geographic areas in the basin (K. Vandemoer, NMFS, personal communication 2001).

Hydropower System Development and Operations - FCRPS

Development and operation of the Federal Columbia River Power System (FCRPS), which includes 13 mainstem dams used for hydropower, navigation, flood control, and irrigation in the Columbia River basin, resulted in widespread changes in riparian, riverine, and upland habitats. Because of the significant loss of mainstem habitat and habitat function associated with the FCRPS, tributary habitat has become more critical to the survival and recovery of Endangered Species Act listed species throughout the Columbia basin, including in the Burnt River subbasin. A wildlife loss assessment was conducted to document losses associated with the Lower Snake River Project (Sather-Blair et al. 1991, Table 14).

Table 14. Estimated losses, in habitat units, for each target species due to construction and operation of the Lower Snake River Project dams (NWPPC 2000)

Target Species	Habitat Units Lost
Downy woodpecker	-364.9
Song sparrow	-287.6
Yellow warbler	-927.0
California quail	-20,508.0
Ring-necked pheasant	-2,646.8
Canada goose	-2,039.8

Because of direct and indirect effects of the FCRPS on fish and wildlife habitat, tributary habitat improvements are required as part of off-site mitigation activities of the U.S. Army Corps of Engineers, the Bureau of Reclamation, and the Bonneville Power Administration for continued operation of the system under the Endangered Species Act. These habitat improvement activities were specified in a Biological Opinion issued by the National Marine Fisheries Service in December, 2000, entitled, “Reinitiation of Consultation on Operation of the Federal Columbia River Power System, Including Juvenile Fish transportation program, and 19 Bureau of Reclamation Projects in the Columbia Basin”.

Hydropower System Development and Operations – Hells Canyon Complex
 Construction and operation of the Hells Canyon Complex of dams by Idaho Power for hydropower generation created an insurmountable barrier to fish passage in the Snake River, cutting off, and eventually eliminating upstream populations of anadromous fish from the ocean. The three dams of the complex, Brownlee, Oxbow and Hells Canyon were completed in 1958, 1961 and 1967, respectively. This three-fold passage barrier is a major obstacle to recovery of anadromous fish stocks in the Burnt River subbasin.

Fish Habitat and Production

Limiting factors occur at two levels, regional and local. These are discussed separately below.

Regional Scale: While clearly acknowledged as a problem in the subbasin, regional scale (out-of-subbasin) limiting factors are often difficult to precisely link to a given fish population although the most dramatic factor limiting anadromous fish in the Burnt subbasin can be identified: there is no fish passage past the Hells Canyon Complex dams. It is beyond the scope of this document to discuss this and other regional-scale limiting factors in detail.

Local Scale: Local scale in-subbasin limiting factors are generally easier to link to specific fish populations. It is important to acknowledge that factors limiting local fish production or survival may differ from those defined across broader scales, and that limiting factors in a given location may vary between species.

Aquatic habitats in the subbasin have undergone both chronic and acute destabilization throughout recent history. Historic improperly managed grazing, mining, logging, stream channelization, riparian clearing, wetlands filling and other developments have all contributed to reduced riparian and stream habitat productivity. Ongoing effects from improperly managed livestock grazing, irrigation withdrawals, road-related activities, and catastrophic floods are responsible for many negative effects to resident fish habitat (Bottom et al. 1985). Table 15 lists some general, negative effects of various land use activities. Land use activities may not only detrimentally affect habitats for fish, but also water quality and quantity, and trophic organization. These activities act to destabilize natural hydrologic processes and amplify the impacts of natural events such as storms. Riparian habitat degradation is the most serious habitat problem in the subbasin for fish (Wissmar et al 1994, ICBEMP 2000). This loss leads to secondary effects that are equally harmful and limiting, including increased water temperature, low summer flows, excessive winter runoff, and sedimentation (Bottom et al. 1985). Additionally, water withdrawals and channel modification have had serious negative impacts on in-stream and riparian habitats and contribute to problems with temperature and flow.

Table 15. Detrimental effects of land use activities on fish habitat and water quality (CRITFC 1995)

Detrimental Effects	Land Use Activity
Channel cross sectioning (<i>increase</i>)	Grazing, Logging
Surface fines (<i>increase</i>)	Grazing, Logging, Road building, Mining, Agriculture
Cobble embededness (<i>increase</i>)	Grazing, Logging, Road building, Mining, Agriculture
Water temperature (<i>increase</i>)	Grazing, Logging, Road building, Agriculture
Organic pollution (<i>increase</i>)	Grazing, Agriculture
Inorganic pollution (<i>increase</i>)	Mining, Agriculture
Runoff (<i>increase</i>)	Grazing, Logging, Agriculture, Urban development
Wetland destruction (<i>increase</i>)	Grazing, Agriculture
Migration problems (<i>increase</i>)	Agriculture
Migration blockages (<i>increase</i>)	Road building
Peak flow (<i>increase</i>)	Road building
Mass failure and surface erosion (<i>increase</i>)	Road building
Bank stability (<i>decrease</i>)	Grazing
Riparian vegetation (<i>decrease</i>)	Grazing, Logging, Agriculture
Pool volume (<i>decrease</i>)	Grazing, Logging, Road building, Mining, Agriculture
Groundwater base flow (<i>decrease</i>)	Grazing, Logging, Road building, Agriculture
Large woody debris (<i>decrease</i>)	Logging
Summer low flow (<i>decrease</i>)	Agriculture

Riparian Habitat Loss

Plentiful riparian cover along streambanks is a vital part of a healthy watershed, providing multiple benefits in the form of nutrient cycling, shading and cover, bank stability, water storage, and filtration and retention (Bottom et al. 1985, Wissmar et al. 1994). Riparian vegetation also hosts various insect species for the aquatic food chain. Loss of riparian cover leads to accelerated surface runoff and erosion, which in turn leads to siltation of spawning beds and rearing habitats. Loss of riparian areas increases solar insolation, elevating water temperatures in summer, or reducing the tempering of water temperature in winter. Loss of riparian cover potentially exposes spawning adults and rearing juveniles to predation and disturbance (Federal Caucus 2000). When riparian vegetation is lost, channel structure becomes more simple as inputs of large woody debris and its influence on channel structure are diminished, affecting instream habitat (Li et al.1994).

Sedimentation

Sedimentation increases temperature and reduces dissolved oxygen concentrations (Federal Caucus 2000) and is abrasive to gill tissue. High turbidity can delay adult migration and interferes with foraging by fish that rely on sight, including salmonids (Bottom et al. 1985).

Flows

Low summer streamflows occur in many of the streams in the Powder subbasin. Although many streams naturally experience low flows in the summer, withdrawals for irrigation and degraded channels exacerbate the problem. Lack of flow interferes with movement,

spawning, and rearing of trout and significantly impairs habitat productivity (Bottom et al. 1985). Lack of adequate water depth reduces the connectivity between aquatic systems, impacting all life stages of redband trout, bull trout and other fish species. Low summer flows also have the effect of concentrating pollutants (phosphates, nitrogen), which can be hazardous to aquatic health.

Temperature

Low flows, reduced riparian cover, and sedimentation also elevate water temperature, considered one of the most important habitat factors in the subbasin endangering salmonids and the top impairment to water quality (Li et al. 2000). Overgrazing on riparian vegetation increases the amount of insolation reaching streams, resulting in cumulative increases in stream temperatures downstream (ODEQ 2000). In addition, the loss of riparian vegetation and its root mass allows widening of stream channels, which increases the width to depth ratio of the channel and exposes greater surface area of the stream to solar heating. Water quality problems related to temperature are found throughout the subbasin. The preferred temperature range for salmonids is between 45° - 60° F, with bull trout preferring colder temperatures (Oregon Plan, Monitoring Protocol). Elevated temperature increases metabolic rate, increases the risk of disease, reduces dissolved oxygen, and affects behavior patterns (Oregon Plan, Monitoring Protocol), all of which impose high metabolic costs and impair survival (ODEQ 2000, Table 5). High water temperatures limit salmonid production and force salmonids to limited cold-water refugia.

Instream Habitat Loss

Loss of instream habitat and habitat diversity limits salmonid production. Loss of riparian vegetation from human activities has led to entrenchment of streams or wider and shallower channels, reducing or destroying in-stream habitat. Human-caused channelization has eliminated floodplains and wetlands and reduced channel complexity, disconnecting floodplains with the stream. A reduction in beaver populations has also limited their contribution to forming wetland and riparian habitat (Wissmar et al 1994). Reduced riparian areas also limit woody debris in streams, diminishing pool quality and frequency. Instream habitat was destroyed in portions of the subbasin by past gold dredging operations; channel hydrology was altered, preferred gravels displaced, and riparian vegetation eliminated. Loss of instream habitat also increases vulnerability to predation (Federal Caucus 2000).

Passage Barriers and Irrigation

Common irrigation practices can present passage barriers to fish within the Burnt subbasin (OWRD 1993). Push-up dams, less common now than historically, greatly restrict passage, both for upstream and downstream migrations if not properly constructed. There is little screening in the subbasin. Unity dam is a significant barrier to fish passage and pre-dates the Hells Canyon Complex. Numerous other dams in the subbasin also prevent fish passage. Other passage barriers include thermal or flow barriers, and impassable culverts, which restrict or limit movement of fish. Irrigation withdrawals can “dewater” sections of streams precluding passage and impairing water quality. Overland return flows from irrigation systems can warm streams, contribute to high levels of fecal coliform, and in some instances load them with silt.

Introduced Species

The Burnt River system hosts a complex of non-native species (Table 8). Although the impacts of these species on native communities are largely undocumented, they likely have some negative effects. Direct impacts may be through predation, competition, disease vector, or interbreeding. Brook trout, a species introduced to many lakes and streams, may interbreed with bull trout, a Threatened species and produce sterile offspring. Their presence in subbasin waters may limit the potential for bull trout recovery.

Wildlife Habitat and Production

In support of the Interior Columbia Basin Ecosystem Management Project (ICBEMP), Wisdom et al. (1994) analyzed habitat change and road associated affects on selected terrestrial vertebrate species in the Interior Columbia Basin. They concluded that changes in terrestrial habitats and disturbances since European settlement have had the most significant effects on terrestrial vertebrates. The most important changes are dramatic shifts in fire regimes; reductions in area of native grassland, shrublands and wetlands; declines in early and late seral stages of forest development; degradation of riparian habitats and increases in road density (Hann et al. 1997, Quigley et al. 1996, USDA Forest Service 1996).

Loss and degradation of terrestrial habitats limit wildlife abundance and diversity in a variety of ways. Habitat conversion and/or invasion by noxious weeds may reduce quality and availability of forage, thus affecting the nutritional condition of wildlife. In addition, large-scale conversion of traditional winter range (valley floors) to alfalfa production has 1) removed large areas from winter range and 2) encouraged elk and deer to remain in the valleys during summer causing damage to alfalfa and other crops. Changes in forest successional stage availability may have a negative impact on wildlife breeding, denning, and thermal cover. Increasing road density may result in direct mortality (collisions, hunting), indirect disturbance, and interruption of migration routes all of which limit survival and reproduction. Limiting factors for terrestrial and semi-aquatic wildlife include:

Loss of Classified Wetland Function

Functioning wetlands of all kinds are important to the natural hydrology of an area. They store and release water in ways that dampen the effects of flooding and reduce erosion. Wetlands also support diverse communities of plants and terrestrial wildlife as well as contributing to the quality of aquatic habitats. Classified wetlands can be divided into three categories:

Wet Meadows: Wet meadows and emergent wetlands were once relatively common throughout the subbasin. These wetland areas served an important function in the hydrology of the area by collecting and filtering water for slow release into the system. Beavers were an integral part of these wetland systems; beaver dams created a succession of wetland types from open water ponds to wet meadows. Wetlands are also home to large and diverse populations of wildlife including shorebirds, waterfowl, raptors, mustelids and amphibians. Wet meadows and emergent wetlands were lost or degraded by conversion to agriculture, mining, road building, livestock introduction and removal of beavers.

Deciduous Riparian Areas: Deciduous riparian areas were once common along portions of all streams in the subbasin. Deciduous riparian areas perform a water storage function, allowing for slow release and dampening the affect of heavy rains and snow melt. This habitat type also serves a variety of wildlife functions including winter range for large

ungulates and nesting for resident and neotropical land birds. This wetland type has been drained and cleared for agricultural use, primarily pasture.

Riverine Deciduous: Riverine deciduous wetland and riparian areas were historically found adjacent to all major stream courses in the subbasin. These areas store water, dampen the effects of high water and help prevent erosion. Their functions for terrestrial wildlife include winter range for large ungulates; breeding areas for neotropical migrant birds; habitat for all life stages of resident land birds; waterfowl nesting; and food, cover and reproduction for a wide array of mammals, reptiles and amphibians. Riverine wetland and riparian areas also provide habitat for resident fish by shading streams and serving as sources of woody debris and other structural components as well as insects for the aquatic food chain. These areas have been lost or degraded through conversion to agriculture, grazing, flood control efforts and construction of large transportation corridors.

Loss of Low Elevation Ponderosa Pine Habitat

Low-elevation Ponderosa Pine (*Pinus ponderosa*) forests were once common on dry sites in the mountain foothills. These forests are the interface between forested and non-forested areas and are home to many species that utilize the grass- and shrub-lands downslope or the forested habitats at higher elevation. These areas are often important winter range for large mammals. Species associated with this habitat type by Wisdom et al. (2000) include the white-headed woodpecker, white-breasted nuthatch, pygmy nuthatch and migratory populations of Lewis' woodpecker. The primary causes for decline in old-forest habitats were intensive timber harvest and large-scale fire exclusion (Hann et al. 1997). Development increasingly encroaches on remaining low-elevation forests, as well.

Factors Associated with Roads

Wisdom et al. (2000) identified 13 factors associated with roads that have a negative impact on terrestrial wildlife. The effect of roads may be direct, such as habitat loss or fragmentation (Miller et al. 1996), or indirect, such as population displacement or avoidance of areas near roads (Mader 1984). The road-associated factors identified in Wisdom et al. (2000) are: snag reduction; down log reduction; habitat loss and fragmentation; negative edge effects; over-hunting; over-trapping; poaching; collection; harassment or disturbance at specific use sites; collisions; movement barrier; displacement or avoidance and chronic, negative interactions with humans. Over-hunting may not be an issue in the subbasin due to efforts by ODFW to significantly reduce hunting opportunities through controlled hunts (G. Keister, personal communication, Oct. 2001). The effects of these factors and references are given in Wisdom et al. (2000, p113). The same authors suggest that mitigating the negative effects of road-associated factors may be more challenging than restoring habitats degraded in other ways.

Loss of Marine Biomass and Trace Elements

Cederholm et al. (2001) present the many diverse relationships between Pacific salmon and terrestrial wildlife. Many species, such as bald eagles and black bears, directly consume salmon carcasses. Others may benefit from concentrations of invertebrates consuming carcasses. The entire system benefits in some way from the influx of biomass and trace elements in salmon carcasses as they become incorporated into both aquatic and terrestrial plants and animals. This once significant source of biomass and trace elements from

outside the subbasin has been lost with the loss of anadromous fish runs. This reduction in biomass in general, and the loss of marine trace elements in particular, likely limit productivity in many areas of the subbasin.

Introduced Species

As described in *Subbasin Description-Noxious Weeds*, invasive species in general are considered number two among threats to biodiversity. Noxious weeds present one of the greatest present threats in the Burnt subbasin. Their spread in some areas is exponential with new areas of infestation discovered frequently (D. Clemens, Tri-County Weed Board, personal communication). Further, funding for weed control programs has fallen during the last decade (ODA 2001) creating a situation where decreasing resources are fighting an increasing invasion. Noxious weeds limit the productivity of rangelands and reduce forage available to wildlife (Sheley and Petroff 1999).

Introduced fauna also threaten biodiversity in the subbasin. Livestock compete with native wildlife for forage and cover and, especially in the case of domestic sheep, can be a vector for devastating diseases.

Loss of Other Old-Growth Forested Habitats

Old-growth was estimated as 35-40% of historic eastside forests but now accounts for less than 5% of the Wallowa Whitman National Forest (Henjum et al. 1994). Old-growth forests, other than low-elevation Ponderosa Pine, provide structurally complex habitats important to a broad range of species including northern goshawk, American marten, fisher, blue grouse, great gray owl and winter wren (Henjum et al 1994). The primary causes for decline in old-forest habitats are intensive timber harvest and fire exclusion (Henjum et al. 1994).

Loss of Habitat Diversity

Many terrestrial species, including invertebrates, thrive in a complex of habitats with different types providing food, cover and breeding areas. Habitat diversity is diminished when aspen stands, shrub thickets and small wetlands are destroyed during timber harvest or development. Grazing can also reduce diversity on rangelands by favoring species more adapted to prolonged grazing pressure. Noxious weed infestations can reduce vegetation to a monoculture as weeds out-compete native plants.

Existing and Past Efforts

There are, currently, no BPA funded projects in the Burnt River subbasin. However, several federal and state agencies and private organizations are working to mitigate for or restore habitats lost or degraded through development and/or poorly managed land use. Some examples of those entities and projects follow.

US Bureau of Land Management

Table 16. Recent BLM accomplishments in the Burnt River subbasin by fiscal year

Year	Accomplishments
2001	Planting of approximately 1.5 miles of stream with native hardwoods and sedge species in the Rattlesnake Gulch area.
2001	Planted 1 mile of stream with willows and cottonwoods. Planted six acres of riparian benches with native grasses along Deer Creek.
2001	BLM continued the partnership and funding with the Baker School District under the Challenge Cost Share Program.
2001	Continued temperature and water quality monitoring of numerous tributaries to the Burnt River.
2001	Re-built enclosure in Sutton Creek area to protect approximately 3 miles of stream and riparian habitat.
2001	Planted approximately 0.5 miles of Pritchard Creek streambank with native vegetation.
2001	Collected cuttings and seed to be used for planting projects.
2000	Placement of large woody debris and rock structures along approximately 1 mile of stream. Planting of native hardwoods and sedge species and seeding of native grass species along approximately 1 mile of stream in the Rattlesnake Gulch area.
2000	Constructed fence on Deer Creek to protect one mile of stream from livestock grazing. Planted native plants along approximately 0.75 mile of Deer Creek.
2000	Temperature and water quality monitoring of sites within the Burnt subbasin.
2001	Collected cuttings and seed to be used for planting projects.
2000	BLM has formed a partnership with the Baker School District under the Challenge Cost Share Program. This allows classes to grow and maintain native plants for the BLM, help in planting projects, provide transportation to the project sites, and manufacture of some planting tools.

US Bureau of Reclamation

The Bureau of Reclamation operates in the Burnt subbasin under the guidance of the Burnt River Project with water storage in Unity Reservoir.

The Bureau of Reclamation has also undertaken the Snake River Resources Review (SR³) with the goal of developing “the best set of tools available to analyze the operation of the river and reservoir system for traditional uses such as irrigation and flood control, and to identify the possible tradeoffs when considering other demands on the system for water related resources such as threatened and endangered species, fish, wildlife, cultural resources, Indian Trust Assets and recreation, as well as water quality and economics” (<http://www.pn.usbr.gov/SR3/overview.html>).

Oregon Department of Fish and Wildlife

Streamflow Restoration Prioritization: ODFW has established the priorities for streamflow restoration needs in the Burnt subbasins well as all other basins in the state. Priorities are based on individual rankings of several biological and physical factors, water use patterns and restoration optimism. Biological and physical factors included the number of native anadromous species, presence of designated “key watersheds”, fish related ecological benefits, other types of ecological benefits, physical habitat condition, the extent of human influence, water quality, current status or proposed as sensitive, threatened, or endangered, presence of instream flow protection (Instream Water Rights), and natural low flow problems. Water use pattern factors included the estimated amount of consumptive use and the frequency that an existing Instream Water Right is not satisfied. The final factor in the ranking of restoration need was an optimism factor of how well the fish resources would respond if flow were restored. Many of these factors were derived from existing data sources while others were ranked by ODFW’s District Fish Biologists, based on local knowledge and professional judgment. Extensive use was made of Geographic Information Systems (GIS) and relational database analytical methods. The flow restoration priorities project was funded by the Oregon Watershed Enhancement Board, through a grant to the Oregon Water Resources Department.

Access and Habitat Program. The Access and Habitat Program of the ODFW is designed to improve wildlife habitat and public hunting access to private lands by providing funding for approved projects. From 1993 to 1996, statewide program accomplishments included over 67,700 acres of habitat enhanced through project funding. Some examples of the Access and Habitat Program at work in the Burnt subbasin include projects to fence riparian areas, assist landowners with improvements to mitigate for wildlife damage, and control noxious weeds.

Green Forage Program. The ODFW Green Forage Program works toward mitigation of wildlife damage to agricultural crops by planting new fields to attract wildlife away from private lands, assisting landowners with seed to replace lost crops, or both. Green Forage program funds are also used to enhance deer habitat, seed private lands with palatable forage after logging, and supply shrubs beneficial to wildlife to landowners at no cost.

Deer Enhancement Program. The goal of the Deer Enhancement Program is to enhance deer habitat. Similar to the Green Forage Program, this program funds seeding on private lands following logging, beneficial shrubs to be given to landowners at no cost, and other habitat improvements

Upland Bird Program. The upland bird program is funded through sales of bird stamps and is directed toward projects, such as riparian fencing, that improve habitat for upland game birds.

Fish Restoration and Enhancement Program. Through the Fish Restoration and Enhancement Program, ODFW develops 10-year cooperative agreements with landowners to exclude cattle from riparian areas. In the Burnt subbasin, this has been initiated by the landowner and, through 1999, has resulted in 0.25 stream miles fenced on the Burnt River.

Oregon Department of Environmental Quality

The ODEQ's comprehensive approach for protecting water quality includes developing pollution load limits, known as Total Maximum Daily Loads (TMDLs) for both point and non-point sources. ODEQ is committed to having federally approved TMDLs on all waterbodies listed on the 1998 303(d) list by the end of the year 2007. The target date for completion of a TMDL in the Burnt subbasin is 2005.

Oregon Water Trust

Oregon's Instream Water Rights Law allows water rights holders to donate, lease or sell some or all of their water right for transfer to instream use. Oregon Water Trust, a private, non-profit group, negotiates voluntary donations, lease or permanent purchase of out-of-stream water rights to convert to instream water rights in those streams where acquisition will provide the greatest ecological benefits for fish and water quality. Acquired rights are held in trust for the people of Oregon by the Oregon Water Resources Department.

Idaho Power

Idaho Power is in the process of conducting studies preliminary to application for relicensing of the Hells Canyon Complex (Idaho Power 2001). The final application is expected to be filed with the Federal Energy Regulatory Commission (FERC) in July 2003. Final Protection, Mitigation and Enhancement measures developed for relicensing may have an impact in the Burnt River subbasin. Steps to provide passage for anadromous fish are under discussion; the results of that discussion will affect the potential for recovery of anadromous fish in the Burnt.

Natural Resources Conservation Service

The NRCS works with landowners and a variety of cooperators including OWEB, USBR, ODA and Ducks Unlimited (DU) to improve aquatic and terrestrial habitat on private land. In the Burnt River subbasin, NRCS has recently assisted with projects to: control noxious weeds; assess riparian areas through properly functioning condition (PFC) surveys; improve water storage to augment late summer flows; stabilize stream banks with juniper rip rap and rock and improve rangeland habitats.

Rocky Mountain Elk Foundation

The mission of the Rocky Mountain Elk Foundation (RMEF) is to ensure the future of elk, other wildlife and their habitat. The RMEF has cooperated with a variety of agencies and organizations in projects affecting the Burnt River subbasin. The following are some examples of those projects since 1995.

- 1995 Blue Mountains Elk Initiative Video – Developed 15 minute video to communicate program successes and encourage additional support.
- 1995 Elkhorn Wildlife Area Viewing Site – Provided interpretive signage/materials for winter elk feeding site.
- 1997, 1998, 1999 Beulah/South Sumpter Elk Telemetry Study – Ongoing study to determine seasonal ranges, migration routes and disease prevalence of elk that winter in these two WMUs.
- 1997, 1998, 1999, 2000 Alder Creek Noxious Weed Treatment – Five-year project to control leafy spurge on a private ranch supporting large numbers of wildlife.

Burnt River Water Quality Report

Sixteen state and federal agencies and organizations signed a Memorandum of Understanding (MOU), which defines a water quality study of the Burnt River Basin. The goals of the study are to provide a broadly-acceptable scientific basis for 1) developing and evaluating alternative approaches to dealing with water temperature concerns, and 2) exploring how these approaches might be applied in a pilot basin in the development of an agricultural water quality management area (SB 1010) plan.

The findings of the study remain in draft form (David Duncan and Associates 2001) and have not been formally approved by the participating organizations.

Present Subbasin Management

Existing Plans, Policies, and Guidelines

Multiple agencies and entities are involved in management and protection of fish and wildlife populations and their habitats in the Burnt River subbasin. Federal, state, and local regulations, plans, policies, initiatives, and guidelines are followed in this effort. Federal involvement in this arena stems from Endangered Species Act responsibilities. Numerous federal, state, and local land managers are responsible for multipurpose land and water use management, including the protection and restoration of fish and wildlife habitat. Management entities and their associated legal and regulatory underpinnings for resource management and protection and species recovery are outlined below.

Federal Government

As a result of the federal government's significant role in the Columbia Basin, not only through the development of the federal hydropower system but as a land manager, and its responsibilities under Section 7(a) of the Endangered Species Act (ESA), several important documents have been published recently that will guide federal involvement in the Burnt subbasin and the Blue Mountains. These documents are relevant to and provide opportunities for states, tribes, local governments, and private parties to strengthen existing projects, pursue new or additional restoration actions, and develop the institutional infrastructure for comprehensive fish and wildlife protection. The key documents include the FCRPS Biological Opinion (discussed previously), the federal All-H paper entitled, Conservation of Columbia Basin Salmon: A Coordinated Federal Strategy for the Recovery of the Columbia-Snake River Basin Salmon, and the Interior Columbia Basin Ecosystem Management Project (ICBEMP). All are briefly outlined below.

FCRPS BiOp

This is a biological opinion written by NMFS and the Fish and Wildlife Service (FWS) regarding the operation of the federal hydropower system on the Columbia River, and fulfills consultation requirements with the U.S. Army Corps of Engineers (USACE), the Bureau of Reclamation (USBR), and the Bonneville Power Administration (BPA) under Section 7 of the ESA. Part of the Reasonable and Prudent Alternative to prevent jeopardy to 12 stocks of anadromous fish considered in the BiOp includes an action to conduct off-

site habitat improvement to correct all barrier, screen and flow deficiencies in certain tributary subbasins.

Federal Caucus All-H Paper

This document is a framework for basin-wide salmon recovery and identifies strategies for harvest management, hatchery reform, habitat restoration, and hydropower system operations. This document may become more relevant to activities in the Burnt River subbasin if relicensing of the Hells Canyon Complex dams includes any provision for anadromous fish passage, which would open the door to potential reintroduction of anadromous fish to the Burnt River.

ICBEMP

This document is a framework for land management for federal lands over the interior Columbia Basin, and was produced by the primary federal land management agencies, including the Forest Service (USFS) and the Bureau of Land Management (BLM). Significantly for this report, this document (if approved) will affect how these federal agencies prioritize actions and undertake and fund restoration activities.

By understanding the priorities outlined in these documents, significant opportunities for federally-funded restoration activities can be refined and further identified for the Burnt subbasin.

Bonneville Power Administration

The Bonneville Power Administration has mitigation responsibility for fish and wildlife restoration under the Fish and Wildlife Program of the Northwest Power Planning Council as related to hydropower development. It is also accountable and responsible for mitigation related to federal Biological Opinions and Assessments for recovery of threatened, endangered, and sensitive species. The recently released FCRPS Biological Opinion calls for the BPA to expand habitat protection measures on non-federal lands. BPA plans to rely on the Council's program as its primary implementation tool for the FCRPS BiOp off-site mitigation requirements.

US Forest Service and Bureau of Land Management

The U.S. Forest Service is required to manage habitat to maintain viable populations of anadromous fish and other native and desirable non-native vertebrate species. A Land and Resource Management Plan (Forest Plan) was developed for the Wallowa-Whitman National Forest (USDA 1990). This Forest Plan guides all natural resource management activities, establishes forest-wide multiple-use goals and objectives, and establishes management standards and guidelines for the Wallowa Whitman National Forest.

The Bureau of Land Management, in accordance with the Federal Land Policy and Management Act of 1976, is required to manage public lands to protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values. A Resource Management Plan was developed for the Vale District Office, Baker Resource Area (USDI 1989). Both the USFS and BLM are required by the Clean Water Act to ensure that activities on administered lands comply with requirements concerning the discharge or run-off of pollutants.

In the Columbia River Basin, the Forest Service and the Bureau of Land Management manage salmonid habitat under the direction of PACFISH (USDA and USDI

1994) and INFISH (Inland Native Fish Strategy; USDA 1995). These interim management strategies aim to protect areas that contribute to salmonid recovery and improve riparian habitat and water quality throughout the Basin, including the Burnt subbasin. These strategies have also facilitated the ability of the federal land managers to meet requirements of the ESA and avoid jeopardy. PACFISH guidelines are used in areas east of the Cascade Crest for anadromous fish. INFISH is for the protection of habitat and populations of listed resident fishes outside anadromous fish habitat. To meet recovery objectives, these strategies:

- Establish watershed and riparian goals to maintain or restore all fish habitat.
- Establish aquatic and riparian habitat management objectives.
- Delineate riparian management areas.
- Provide specific standards and guidelines for timber harvest, grazing, fire suppression and mining in riparian areas.
- Provide a mechanism to delineate a system of key watersheds to protect and restore important fish habitats.
- Use watershed analyses and subbasin reviews to set priorities and provide guidance on priorities for watershed restoration.
- Provide general guidance on implementation and effectiveness monitoring.
- Emphasize habitat restoration through such activities as closing and rehabilitating roads, replacing culverts, changing grazing and logging practices, and replanting native vegetation along streams and rivers.

The Interior Columbia Basin Ecosystem Management Project (ICBEMP) is a regional-scale land-use plan that covers 63 million acres of federal lands in Oregon, Washington, Idaho, and Montana <http://www.icbemp.gov/>. The BLM and USFS released a Supplemental Draft Environmental Impact Statement for the ICBEMP Project in March 2000. The EIS focuses on the critical broad scale issues related to: landscape health; aquatic and terrestrial habitats; human needs and products and services. If approved, ICBEMP will replace the interim management strategies, providing for longer-term management of lands east of the Cascades. If ICBEMP is implemented, subbasin and watershed assessments and plans will target further habitat work (NMFS 2000).

The Bureau of Land Management is developing the Northeastern Oregon Assembled Land Exchange (NOALE) for the retention, exchange, and disposal of public land (USDI 1998). The goal of the exchange is to enable the BLM to more effectively meet ecosystem management objectives, to consolidate BLM managed lands for more effective and efficient resource protection, enhancement, and use; and to ensure that retained lands have sufficient public benefit to merit the costs of management (Land Exchange Act).

US Fish and Wildlife Service

The U.S. Fish and Wildlife Service administers the Endangered Species Act (ESA) for resident fish and wildlife. This act provides for the conservation of the ecosystem upon

which T&E species of fish, wildlife, and plants depend and directs enforcement of federal protection laws. Within the Burnt River subbasin, the wintering bald eagle is a federally listed species. The endangered gray wolf (from Idaho reintroductions) has been discovered in the Blue Mountains northwest of the Burnt subbasin although none are known to reside in the subbasin. The federal Migratory Bird Act also protects migratory birds and their habitats within the subbasin. Additional programs include wetland habitat improvement and Partners for Wildlife.

The USFWS also administers the Lower Snake River Fish and Wildlife Compensation Plan (LSRCP) authorized by the Water Resources Development Act of 1976 (Public Law 94-587). The goal of the LSRCP is to mitigate and compensate for fish and wildlife resource losses caused by construction and operation of the four lower Snake River dams and navigation lock projects (FWS 1998). The fishery resource compensation plan identified the need to replace adult salmon and steelhead and resident trout fishing opportunities. The size of the anadromous program was based on estimates of adult salmon and steelhead returns to the Snake River basin prior to the construction of the four lower Snake River dams.

National Marine Fisheries Service

The National Marine Fisheries Service administers the ESA as it pertains to anadromous fish only. The NMFS has jurisdiction over actions pertaining to Snake River spring and fall chinook salmon and Snake River Basin Steelhead. If the relicensing process for the Hells Canyon Complex dams includes any provision for fish passage at those dams, reintroduction of anadromous fish may become feasible and NMFS would have jurisdiction in that effort. Under the ESA's 4(d) rule, "take" of listed species is prohibited and permits are required for handling. Harvest management plans are required for fisheries in the Snake River Basin. Fisheries Management and Evaluation Plans have been developed for warmwater fisheries and sturgeon in the Snake River basin; others are scheduled. Biological Opinions, recovery plans, and habitat conservation plans for federally listed fish and aquatic species help target and identify appropriate watershed protection and restoration measures.

The recent Federal Columbia River Power System (FCRPS) Biological Opinion and the Basinwide Salmon Recovery Strategy (All-H Paper) contain actions and strategies relevant to the Snake River and tributaries for habitat restoration and protection. Other aspects of hatchery and harvest apply as well. Action Agencies (USBR, USACE, BPA) are identified that will potentially lead fast-start efforts in specific aspects of restoration on non-federal lands. Federal land management will be implemented by current programs that protect important aquatic habitats (PACFISH, ICBEMP). Actions within the FCRPS BiOp are intended to be consistent with or complement the NWPPC's amended Fish and Wildlife Program, the Clean Water Action Plan, the Unified Federal Policy for a Watershed Approach to Federal Land and Resource Management, the Inter-Governmental Task Force for Monitoring Principles (Oregon Plan), and state and local watershed planning efforts.

Environmental Protection Agency

The U.S. Environmental Protection Agency is responsible for implementing and administering the Clean Water Act (CWA). Accelerated and strengthened efforts to

achieve clean water and aquatic habitats was the intent of the Clean Water Initiative (1998), the core of which is the Clean Water Action Plan (CWAP), a federal partnership to promote and enhance locally based watershed improvements (the Unified Federal Policy for Ensuring a Watershed Approach to Federal Land and Resource Management). A key action with the CWAP was Unified Watershed Assessments (UWA), which identified watersheds not meeting state water quality standards and other restoration goals, and established restoration priorities. Restoration strategies called Total Maximum Daily Loads (TMDL) are being developed for the Columbia River mainstem and tributaries (including the Burnt subbasin), based on court orders and negotiated agreements through CWA litigation. EPA serves an oversight and advisory role in development of TMDLs. Watershed level efforts through the CWAP will improve water quality, restore habitat, and recover threatened and endangered species. Other NRCS programs include river Basin Studies, Forestry Incentive program, Wildlife Habitat Improvement Program and Wetlands Reserve Program.

U.S.D.A. Natural Resources Conservation Service

Within the U.S. Department of Agriculture (USDA), the Natural Resources Conservation Service (NRCS) oversees the implementation of conservation programs to help solve natural resource concerns. The Environmental Quality Incentives Program (EQIP), established in the 1996 Farm Bill, provides a voluntary conservation program for farmers and ranchers who face serious threats to soil, water, and related natural resources. The Conservation Reserve Program (CRP) puts sensitive croplands under permanent vegetative cover. The Conservation Reserve Enhancement Program (CREP) helps to establish forested riparian buffers. The NRCS assists landowners to develop farm conservation plans and provides engineering and other support for habitat protection and restoration (PL 566). The Farm Services Administration provides funds.

Farm Services Agency

The Farm Services Agency (FSA) administers U.S. Department of Agriculture farm commodity programs; operating and emergency loans; conservation and environmental programs; emergency and disaster assistance; domestic and international food assistance and international export credit programs. Conservation program payments that FSA administers include the CRP and the Environmental Quality Incentives Program (EQIP). Technical assistance for these programs is provided by the NRCS.

Federal, State, Tribal and Private Partnership

Blue Mountains Elk Initiative

The Blue Mountains Elk Initiative is a federal, private, state and tribal Partnership to manage elk in the Blue Mountains of Oregon and Washington. The mission of the Initiative is to more effectively manage elk and elk habitat in the Blue Mountains with an emphasis on working closely with landowners to alleviate damage, using more than 90 percent of funding for on-the-ground projects and obtaining consensus on elk management from all partners and interested groups. Partners in the Blue Mountains Elk Initiative employ a variety of methods to improve elk and habitat management including fencing, water development, noxious weed control, and research and education.

State Government - Oregon

Senate Bill 1010

Senate Bill 1010 allows the Oregon Department of Agriculture (ODA) to develop Water Quality Management plans for agricultural lands where such actions are required by state or federal law, such as TMDL requirements. The Water Quality Management Plan should be crafted in such a way that landowners in the local area can prevent and control water pollution resulting from agricultural activities. Local stakeholders will be asked to take corrective action against identified problems such as soil erosion, nutrient transport to waterways and degraded riparian areas. It is the ODA's intent to establish WQMPs on a voluntary basis. Senate Bill 1010 allows the ODA to use civil penalties when necessary to enforce against agricultural activity that is found to transgress parameters of an approved WQMP.

Oregon Department of Fish and Wildlife

Oregon Department of Fish and Wildlife is responsible for protecting and enhancing Oregon fish and wildlife and their habitats for present and future generations. Management of the fish and wildlife and their habitats in the Burnt River subbasin is guided by ODFW policies and federal and state legislation. Direction for ODFW fish and wildlife management and habitat protection is based on the amendments and statutes passed by the Oregon Legislature through the 2001 session. For example, Oregon Administrative Rule (OAR) 635 Division 07 – Fish Management and Hatchery Operation sets forth policies on general fish management goals, the Natural Production Policy, the Wild Fish Management Policy, and other fish management policies and OAR 635 Division 008 – Department of Wildlife Lands sets forth management goals for each State Wildlife Area. Another pertinent ODFW policy is the Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources. In addition to the OAR's, ODFW has developed a variety of species-specific management plans. <http://www.dfw.state.or.us/>

Mule Deer Management Plan

The goal of ODFW's Mule Deer Management Plan (ODFW 1990) is to manage mule deer populations to provide optimum recreational benefits to the public, and to be compatible with habitat capability and primary land uses. The plan summarizes the life history of mule deer and their management in Oregon, lists concerns and the strategies to be used in addressing identified problems, and provides management direction to inform the interested public of how mule deer will be managed.

Elk Management Plan

The goal of ODFW's Elk Management Plan (ODFW 1992) is to protect and enhance elk populations in Oregon to provide optimum recreational benefits to the public and to be compatible with habitat capability and primary land uses. The plan summarizes the life history of elk and their management in Oregon. The plan also lists concerns and the strategies to be used in addressing identified problems, and provides management direction to inform the interested public of how elk will be managed.

Bighorn Sheep Management Plan

ODFW's Bighorn Sheep Management Plan (ODFW 1992) summarizes the history and status of Oregon's bighorn sheep and presents a means by which they will be restored to remaining suitable habitat. The plan serves as a guide for transplanting efforts, assists concerned resource management agencies with wildlife planning efforts, and provides management direction for Oregon's bighorn sheep program. The plan describes 16 bighorn sheep management concerns and recommends strategies to address these concerns.

Mountain Goat Management Plan

ODFW's Interim Mountain Goat Management Plan (2000) summarizes the history and status of mountain goats in Oregon and presents a means by which they will be restored to remaining suitable habitat. The plan provides a record of reintroductions and a guide for future efforts as well as offering management direction for Oregon's mountain goat program.

Cougar Management Plan

The three goals of ODFW's Cougar Management Plan (ODFW 1993) are 1) recognize the cougar as an important part of Oregon's wildlife fauna, valued by many Oregonians, 2) maintain healthy cougar populations within the state and into the future, and 3) conduct a management program that maintains healthy populations of cougar and recognizes the desires of the public and the statutory obligations of the Department. The plan summarizes the life history of cougar and their management in Oregon. The plan also lists concerns and the strategies to be used in addressing identified problems. Management direction is provided to inform the interested public of how cougar will be managed.

Black Bear Management Plan

The three goals of ODFW's Black Bear Management Plan (ODFW 1987) are 1) recognize the black bear as an important part of Oregon's wildlife fauna, valued by many Oregonians, 2) maintain healthy black bear populations within the state and into the future, and 3) conduct a management program that maintains healthy populations of black bear and recognizes the desires of the public and the statutory obligations of ODFW. The plan summarizes the life history of black bear and their management in Oregon. The plan lists concerns and the strategies to be used in addressing identified problems, and provides management direction to inform the interested public of how black bear will be managed.

Migratory Game Bird Program Strategic Management Plan

The mission of ODFW's Migratory Game Bird Program Strategic Management Plan (ODFW 1993) is to protect and enhance populations and habitats of native migratory game birds and associated species at prescribed levels as determined by national, state, and flyway plans) throughout natural geographic ranges in Oregon and the Pacific Flyway to contribute to Oregon's wildlife diversity and the uses of those resources. Strategies are described that assist in the development of specific operational plans to achieve the program mission and integrate with other state and federal agencies and private organizations. The plan mandates the formation and implementation of more specific operational plans, especially in regard to habitat programs and biological surveys.

Oregon Wildlife Diversity Plan

ODFW's Oregon Wildlife Diversity Plan (ODFW 1993d) provides policy direction for the maintenance and enhancement of the vertebrate wildlife resources in Oregon. The plan identifies goals and objectives for maintaining a diversity of non-game wildlife species in Oregon, and provides for coordination of game and non-game activities for the benefit of all species.

Fish Species Plans

ODFW uses plans that provide statewide direction for approaches to trout, steelhead, warmwater fish, coastal chinook, and coho salmon management to frame strategies subsequently proposed in basin-specific fish management plans. These plans contain broad guidelines and statewide directions. In the Burnt subbasin, the trout and warmwater plans are pertinent.

Oregon's Trout Plan

The trout plan describes a series of management alternatives that provide guidelines and criteria for protecting wild fish and providing angling in a variety of circumstances. In basin plans, these alternatives provide a context for specific angling regulations. Management objectives are focused on the protection of wild fish and their habitats, providing diverse angling opportunities, making hatchery programs effective and diminishing dependence on hatchery releases, and making the public more aware of trout resources and management issues.

Warmwater Fish Plan

The warmwater plan also categorizes management into alternatives that frame regulations. Because warmwater fishes are non-native, the focus is not on species conservation but on providing diverse angling opportunities reflecting the wide distribution of the many species that are classified as "warmwater." Where biological and physical conditions are suitable, the plan directs management to increase the quality of angling. Management of these species is constrained by conservation needs of native fishes.

Oregon State Police

The Fish and Wildlife Division of the Oregon State Police (OSP) is responsible for enforcement of fish and wildlife regulations in the State of Oregon. The Coordinated Enforcement Program (CEP) ensures effective enforcement by coordinating enforcement priorities and plans by and between OSP officers and ODFW biologists. OSP develops yearly Actions Plans to guide protection efforts for critical species and their habitats. Action Plans are implemented through enforcement patrols, public education, and agency coordination. Voluntary and informed compliance is cornerstone with the Oregon Plan concept. The need for continued fish protection is a priority in accordance with Governors Executive Order 99-01.

Oregon Division of State Lands

The Oregon Division of State Lands (ODSL) regulates fill and/or removal of material from the bed or banks of streams (ORS 196.800 – 196.990) through the issuance of permits. Permit applications are reviewed by ODFW, U.S. Army Corps of Engineers, DEQ, the

counties, and adjoining landowners, and may be modified or denied based on project impacts to fish populations or significant comments received during the review process.

Oregon Water Resources Department

The Oregon Water Resources Department (OWRD) regulates water use in the subbasin in accordance with Oregon Water Law. Statutes for water appropriation (ORS 537) govern the use of public waters; Water Right Certificates appurtenant to the different lands within the subbasin specify the maximum rate and/or volume of water that can be legally diverted. Oregon water law is based on the prior appropriation doctrine, which results in water being distributed to senior water right holders over junior water right holders during times of deficiency. The law also requires the diverted water be put to beneficial use without waste. WRD acts as trustee for in-stream water rights issued by the state of Oregon and held in trust for the people of the state. The Water Allocation Policy (1992) tailors future appropriations to the capacity of the resource, and considers water to be “over-appropriated” if there is not enough water to meet all demands at least 80% of the time (80% exceedence). The ODFW has developed a list of streamflow restoration priorities for fish in the Burnt River subbasin in Oregon. <http://www.wrd.state.or.us/>

Oregon Department of Environmental Quality

The Oregon Department of Environmental Quality (DEQ) is the regulatory agency responsible for implementing the 1972 federal Clean Water Act and enforcing state water quality standards for protection of aquatic life and other beneficial uses. It is instrumental in designating 303(d) water quality limited streams and is charged with developing Total Maximum Daily Load (TMDL) programs.

Oregon Department of Agriculture

The Department of Agriculture oversees several programs in the Natural Resource Division that address soil, water, and plant conservation in the subbasin. Soil and Water Conservation Districts, Watershed Councils, the Environmental Quality Incentives Program (EQIP), and Coordinated Resource Management Planning (CRMP) are under the jurisdiction of the Department of Agriculture as is the Oregon Noxious Weed Strategic Plan. The Coordinated Resource Management Planning (CRMP) group addresses watershed management issues within specific subbasins and develops stream restoration goals and objectives. The ODA is responsible for the agricultural portion of the WQMP and TMDL.

Oregon Department of Forestry

The Oregon Department of Forestry enforces the Oregon Forest Practices Act (OAR 629-Division 600 to 680 and ORS 527) regulating commercial timber production and harvest on state and private lands. The OFPA contains guidelines to protect fish bearing streams during logging and other forest management activities, which address stream buffers, riparian management, and road maintenance. The Oregon Department of Forestry is responsible through the OFPA for administering the forestry portion of the Water Quality Management Plan and TMDL and provides technical input to the conservation reserve enhancement program (CREP).

Oregon Department of Parks and Recreation

The Oregon Department of Parks and Recreation implements the State Scenic Waterways Act and administers and manages State Parks within the subbasin.

The Land Conservation and Development Commission

The Land Conservation and Development Commission regulates land use on a statewide level. County land use plans must comply with statewide land use goals. 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, and floodplains and in sensitive wildlife areas.

County and Local

County Governments

County Commissioners have established Comprehensive Plans for land use within each county in Oregon. A riparian element within the Plan is designed to establish certain regulatory control over specific activities to 1) ensure open space, 2) protect scenic, historic, and natural resources for future generations, and 3) promote healthy and visually attractive environments in harmony with the natural landscape. A riparian setback is specified in the Riparian Overlay Area Designation to conserve fish and wildlife habitat and enhance streambank stability. Some counties also assist with funding of county watershed activities in collaboration with OWEB.

Powder Basin Watershed Council

Under House Bill 2215 and its successor, HB 3441, the State of Oregon has authorized the formation of watershed councils in an attempt to include local knowledge and cooperation in addressing Oregon's environmental issues. Baker County has convened and legally recognizes this Council as empowered to shoulder the responsibility of retaining, restoring and enhancing the health of its watersheds. The Council's mission is to: Analyze watershed conditions, develop short and long-range plans and projects to protect or improve watershed conditions, educate the people in the community about the watershed conditions and function, enlist the people in the community to participate in the projects, develop peer and/or legislative partnerships when needed to achieve results and remain in compliance with legislative and legal requirements.

Other Entities and Organizations

Oregon Water Trust

Oregon Water Trust (OWT), a private, non-profit group, leases and purchases consumptive water rights for in-stream use to enhance streamflows in Oregon. Added responsibility for water brokerage contracts to restore instream flows is implied in the FRCPS BiOp.

<http://www.owt.org/>

The Nature Conservancy

The Nature Conservancy protects the lands and waters, which plant and animals species need to survive. It is instrumental in purchasing lands for habitat protection, working with agencies with similar objectives. <http://nature.org/>

Northwest Power Planning Council - NWPPC

Formed under the Pacific Northwest Electric Power Planning and Conservation Act of 1980, the NWPPC is directed to develop a program to “protect, mitigate, and enhance fish and wildlife, included related spawning grounds and habitat, in the Columbia River and its tributaries... affected by the development, operation, and management of [hydroelectric project]...” the BPA funds the Council’s program. <http://www.nwcouncil.org/>

Columbia River Basin Forum

Formerly called The Three Sovereigns, the Columbia River Basin Forum is designed to improve management of fish and wildlife resources in the Columbia River Basin. The process is an effort to create a new forum where the federal government, Northwest states and tribes could better discuss, coordinate, and resolve basinwide fish and wildlife issues under the authority of existing laws. The Forum is included as a vehicle for implementation of the Basinwide Salmon Recovery Strategy.

Existing Goals, Objectives, and Strategies

The Burnt River subbasin has diverse populations of fish and wildlife and unique areas of habitat that are of economic and ecological significance to the people of the State of Oregon and the Northwest. Many of the natural resources of the Burnt subbasin are managed for the benefit of the people of the entire Nation by way of the large amount of federal land. The overall goal for the Burnt subbasin is to restore the health and function of the ecosystem to ensure continued viability of these important populations.

Numerous federal, state, and local entities are charged with maintenance and protection of the natural resources of the Burnt subbasin. The following section, organized by entity, illustrates the full range of goals, objectives and strategies guiding activities relative to fish, wildlife and habitats in the Burnt River subbasin. To the casual observer, these may appear redundant and leave the impression that each entity is working independently and only toward its own goals. However, agencies and other entities in the subbasin are working together toward these goals through a variety of coalitions. On a case-by-case basis, cooperators in the subbasin combine individual institutional goals to achieve a common subbasin goal.

Federal

US Forest Service

Management Objectives

(PACFISH/INFISH 1995) part of amended Forest LRMP for Wallowa-Whitman NF:

Fish and Fish Habitat Objectives (Riparian Management Objectives - RMO)

- Objective 1.** Establish Pool Frequencies (#pools/mi) dependent on width of wetted stream
Width 10 20 25 50 75 100 125 150 200; # pools 96 56 47 26 23 18 14 12
9
- Objective 2.** Comply with state water quality standards in all systems (max < 68°F)
- Objective 3.** Establish large woody debris in all forested systems (> 20 pieces/mi, > 12 in diameter, > 35 ft length).
- Objective 4.** Ensure > 80% bank stability in non-forested systems
- Objective 5.** Reduce bank angles (undercuts) in non-forested systems (> 75% of banks with < 90° angle).

Objective 6. Establish appropriate width/depth ratios in all systems (< 10, mean wetted width divided by mean depth).

General Riparian Area Management

Objective 1. Identify and cooperate with federal, tribal, and state and local governments to secure instream flows needed to maintain riparian resources, channel conditions, and aquatic habitat

Objective 2. Fell trees in Riparian Habitat Conservation Areas when they pose a safety risk. Keep felled trees on site when needed to meet woody debris objectives.

Objective 3. Apply herbicides, pesticides, and other toxicants/chemicals in a manner to avoid impacts that are inconsistent with attainment of RMOs.

Objective 4. Locate water drafting sites to minimize adverse effects on stream channel stability, sedimentation, and in-stream flows.

Watershed and Habitat Restoration

Objective 1. Design and implement watershed restoration projects in a manner that promotes the long-term ecological integrity of ecosystems, conserve the genetic integrity of native species, and contributes to attainment of RMOs.

Objective 2. Cooperate with federal, state, and tribal agencies, and private landowners to develop watershed-based CRMPs or other cooperative agreements to meet RMOs.

Fisheries and Wildlife Restoration

Objective 1. Design and implement fish and wildlife habitat restoration and enhancement activities in a manner that contributes to attainment of the RMOs.

Objective 2. Design, construct, and operate fish and wildlife interpretive and other use-enhancement facilities in a manner that is consistent with attainment of RMOs.

Objective 3. Cooperate with federal, state, and tribal wildlife management agencies to identify and eliminate wild ungulate impacts that are inconsistent with attainment of RMOs.

Objective 4. Cooperate with federal, state, and tribal fish management agencies to identify and eliminate impacts associated with habitat manipulation, fish stocking, fish harvest, and poaching that threaten the continued existence and distribution of native fish stocks inhabiting federal lands.

US Bureau of Land Management

Objective 1. Coordinate program administration and watershed restoration activities.

Strategy 1.1. Facilitate inter-agency coordination of program activities and projects.

Strategy 1.2. Coordinate planning, prioritization, design and implementation of restoration projects.

Strategy 1.3. Provide technical support for project planning, design and implementation.

Objective 2. Improve in-stream habitat diversity for migrating, spawning, and rearing of native fish species.

- Strategy 2.1. Implement in-stream habitat restoration according to sound fluvial geomorphic principals.
- Strategy 2.2. Increase pools w/LWD to improve over-winter survival of juveniles.
- Strategy 2.3. Decrease width and increase stream depth.
- Strategy 2.4. Identify cool water refugia and protect and restore in-stream and riparian habitat.
- Strategy 2.5. Construct off-channel rearing areas from springs and add LWD component for habitat complexity.
- Strategy 2.6. Increase sinuosity to return streams to natural form

Objective 3. Enhance riparian condition (vegetation, function, etc.)

- Strategy 3.1. Implement riparian plantings for shade, cover, and LWD recruitment.
- Strategy 3.2. Design riparian management plans with fencing and off-site watering.
- Strategy 3.3. Restore wet meadows.
- Strategy 3.4. Treat noxious weeds and seed/plant treated areas with native vegetation after treatment.

Objective 4. Reduce stream sedimentation.

- Strategy 4.1. Revegetate streambanks with native vegetation
- Strategy 4.2. Treat noxious weeds and seed/plant treated areas with native vegetation after treatment.
- Strategy 4.3. Construct structures as appropriate to the site (e.g., J-hooks, W-weirs, other rock structures).
- Strategy 4.4. Use bio-engineering where hard structures are not appropriate or possible.
- Strategy 4.5. Determine the source of the problem (e.g., land use, changed hydrograph) and correct if possible.
- Strategy 4.6. Identify and fix road related sources of sediment. Replace undersized culverts, surface and maintain existing roads, close or restrict access to roads not needed for management.

Objective 5. Improve upland watershed condition and function.

- Strategy 5.1. Treat and contain noxious weeds. Seed and/or plant treated areas with native vegetation after treatment.
- Strategy 5.2. Construct livestock pasture fencing.
- Strategy 5.3. Promote the development of off-stream watering systems for livestock (often in conjunction with riparian fencing projects).
- Strategy 5.4. Manipulate tree density.
- Strategy 5.5. Promote the reseeding of areas affected by natural processes (e.g. mass wasting, rain on snow, forest fires) to accelerate the regeneration of ground cover to minimize the potential for erosion and noxious weed invasions.
- Strategy 5.6. Promote and maintain partnerships to fund program implementation.

Objective 6. Improve adult and juvenile fish passage.

Strategy 6.1. Replace/modify inadequate culverts.

Strategy 6.2. Repair inadequate crossings (fords) by hardening the entrances and stream bottom or by replacing them with culverts or bridges as appropriate.

Objective 7. Improve water quality.

Strategies: All tasks under Objectives 2, 3, 4, and 5.

State of Oregon

Oregon Department of Forestry

Goal: Protect, manage and promote a healthy forest environment, which will enhance Oregon's livability and economy for today and tomorrow.

Oregon Department of Agriculture

Oregon Noxious Weed Strategic Plan

Goal: Heightened awareness among Oregon's citizens, the legislature, local governments, tribal governments, conservation organizations and land managers of the impact of noxious weeds and the need for effective noxious weed management.

Objective 1. Leadership and Organization

Strategy: Provide consistent statewide and local leadership and organization

Objective 2. Cooperative Partnerships

Strategy: Develop and expand partnerships

Objective 3. Planning and Prioritizing

Strategy. Develop and maintain noxious weed lists and plans all levels

Objective 4. Education and Awareness

Strategy: Provide education and awareness

Objective 5. Integrated Weed Management (IWM)

Strategy: Continue to support and advocate the principles of IWM

Objective 6. Early Detection and Control of New Invaders

Strategy: Implement early detection and control

Objective 7. Noxious Weed Information System and Data Collection

Strategy: Upgrade Noxious Weed Information System

Objective 8. Monitoring and Evaluation

Strategy: Monitor noxious weed projects to evaluate effectiveness

Objective 9. Policy, Mandates, Law Compliance and Enforcement

Strategy: Use mandates, policy and law to encourage effective weed management

Objective 10. Funding and Resources

Strategy: Increase base level funding for state, county local, and federal noxious weed control programs to address priorities and to assist private land managers.

Strategy: Additional funding sources for weed control.

Oregon Department of Environmental Quality

Goal:

- Restore, maintain and enhance the quality of Oregon's air, water and land.

Oregon Parks and Recreation Department

Goal:

- Provide and protect outstanding natural, scenic, cultural, historic, and recreational sites for the enjoyment and education of present and future generations.

Oregon Division of State Lands

Goals:

- Manage and protect state trust lands for the maximum long-term benefit of the public schools, consistent with sound stewardship, conservation and business management principles.
- Manage non-trust lands for the greatest benefit of all the people of the state.

Oregon State Police

Goal:

- Develop, promote and maintain protection of the people, property, and natural resources of the state.
-

Department of Land Conservation and Development

Goals:

- Establish a framework for all land use decisions and actions.
- Preserve and maintain all agricultural lands.
- Conserve forest lands in a manner consistent with sound management of soil, air, water, and fish and wildlife resources, and to provide for recreational opportunities and agriculture.
- Protect natural resources and conserve scenic and historic areas and open spaces.
- Maintain and improve the quality of the air, water, and land resources of the state.
- Protect life and property from natural disasters and hazards.

Oregon Water Resources Department

Goal: To serve the public by practicing and promoting wise long-term water management. Oregon Revised Statutes are laws passed by the legislative bodies (House and Senate) of Oregon, giving guidance to ODFW for management of fish and wildlife resources. ORS 496.012 refers specifically to wildlife, but fish are included as part of wildlife.

Oregon Revised Statute - ORS 496.012

Goals:

- Species of wildlife maintained at optimum levels.

- Lands and waters of this state that are developed and managed to enhance the production and public enjoyment of wildlife.
- Utilization of wildlife that is orderly and equitable.
- Public access to lands and waters of the state, and the wildlife resources thereon, that are developed and maintained.
- Wildlife populations and public enjoyment of wildlife are regulated compatibly with primary uses of the lands and waters of the state.
- Provision of optimal recreational benefits

Oregon Department of Fish and Wildlife

ODFW's vision is that "Oregon's fish and wildlife are thriving in healthy habitats due to cooperative efforts and support by all Oregonians" (ODFW 2000). The vision for the Burnt subbasin is to improve habitat health and function for the enhancement and productivity of wild, native resident trout, and numerous wildlife species (ODFW 1990).

Warmwater Game Fish Plan

Goal:

- Provide optimum recreational benefits to the people of Oregon by managing warmwater game fishes and their habitats.

Objective 1. Provide diversity of angling opportunity

- Strategy 1. Identify the public's needs and expectation for angling opportunity.
- Strategy 2. Choose management alternatives for individual waters or groups of waters, and incorporate the alternatives in management plans subject to periodic public review.
- Strategy 3. Design management approaches to attain the chosen alternative.
- Strategy 4. Constantly remind the public of the consequences of unlawful transfers of fishes in order to reduce the incidence of the introductions.
- Strategy 5. Inform the public as to why ODFW chooses particular management strategies, in order to establish a positive perception of warmwater game fish.
- Strategy 6. Use existing state and federal laws and regulations to deal with illegal introductions.

Trout Plan

Goal:

- Achieve and maintain optimum populations and production of trout to maximize benefits and to insure a wide diversity of opportunity for present and future citizens.

Objective 1. Maintain the genetic diversity and integrity of wild trout stocks throughout Oregon.

- Strategy 1. Identify wild trout stocks in the state.
- Strategy 2. Minimize the adverse effects of hatchery trout on biological characteristics, genetic fitness, and production of wild stocks.
- Strategy 3. Establish priorities for the protection of stocks of wild trout in the state.

Strategy 4. Evaluate the effectiveness of trout management programs in providing the populations of wild trout necessary to meet the desires of the public.

Objective 2. Protect, restore and enhance trout habitat.

Strategy 1. Continue to strongly advocate habitat protection with land and water management agencies and private landowners.

Objective 3. Provide a diversity of trout angling opportunities.

Strategy 1. Determine the desires and needs of anglers.

Strategy 2. Use management alternatives for classifying wild trout waters to provide diverse fisheries.

Strategy 3. Conduct an inventory of public access presently available to trout waters in the state.

Objective 4. Determine the statewide management needs for hatchery trout.

Strategy 1. Summarize information on the current hatchery program and determine necessary changes.

Strategy 2. Increase the involvement of the STEP program in the enhancement of trout.

Strategy 3. Publicize Oregon's trout management program through the ODFW office of Information and Education.

Oregon Wildlife Diversity Plan (ODFW 1993)

Goal:

- Maintain Oregon's wildlife diversity by protecting and enhancing populations and habitats of native non-game wildlife at self-sustaining levels throughout natural geographic ranges.

Objective 1. Protect and enhance populations of all existing native non-game species at self-sustaining levels throughout their natural geographic ranges by supporting the maintenance, improvement or expansion of habitats and by conducting other conservation actions.

Strategy 1.1. Maintain existing funding sources and develop new sources of public, long-term funding required to conserve the wildlife diversity of Oregon.

Strategy 1.2. Identify and assist in the preservation, restoration and enhancement of habitats needed to maintain Oregon's wildlife diversity and non-consumptive recreational opportunities.

Strategy 1.3. Monitor the status of non-game populations on a continuous basis as needed for appraising the need for management actions, the results of actions, and for evaluating habitat and other environmental changes.

Objective 2. Restore and maintain self-sustaining populations of non-game 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.

Strategy 2.1. 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.

Strategy 2.2. Reintroduce species or populations where they have been extirpated as may be feasible.

Objective 3. Provide recreational, educational, aesthetic, scientific, economic and cultural benefits derived from Oregon's diversity of wildlife.

Strategy 3.1. Develop broad public awareness and understanding of the wildlife benefits and conservation needs in Oregon.

Strategy 3.2. Increase or enhance opportunities for the public to enjoy and learn about wildlife in their natural habitats.

Strategy 3.3. Seek outside opportunities, resources and authorities and cooperate with other agencies, private conservation organizations, scientific and educational institutions, industry and the general public in meeting Program Objectives.

Strategy 3.4. Maintain and enhance intra-agency coordination through dissemination of Program information, development of shared databases and coordination of activities that affect other Department divisions and programs; identify activities within other programs which affect the Wildlife Diversity program, and develop mutual goals.

Objective 4. Address conflicts between non-game wildlife and people to minimize adverse economic, social, and biological impacts.

Strategy 4.1. Assist with non-game property damage and nuisance problems without compromising wildlife objectives, using education and self-help in place of landowner assistance wherever possible.

Strategy 4.2. Administer the Wildlife Rehabilitation Program.

Strategy 4.3. Administer the Scientific Taking Permits Program.

Strategy 4.4. Administer Wildlife Holding and other miscellaneous permits.

Strategy 4.5. Provide biological input to the Falconry Program for the establishment of raptor-capture regulations.

Strategy 4.6. Update the Wildlife Diversity Plan every five years.

Oregon Black Bear Management Plan (ODFW 1987)

Goal:

- Protect and enhance black bear populations in Oregon to provide optimum recreational benefits to the public and to be compatible with habitat capability and primary land uses.

Objective 1. Determine black bear population characteristics.

Strategy 1.1. 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.

Objective 2. Determine black bear harvest levels.

Strategy 2.1. Obtain improved harvest information through use of combination report card/tooth envelope.

Strategy 2.2. Monitor black bear harvest and implement harvest restrictions if necessary.

Strategy 2.3. Develop an educational program to alert black bear hunters of the need for improved black bear population information.

Strategy 2.4. If necessary, initiate mandatory check of harvested black bear.

Objective 3. Continue current practice of allowing private and public landowners to take damage causing black bear without a permit.

Strategy 3.1. The Department will not seek any changes in current statutes.

Strategy 3.2. Continue to work with other agencies and private landowners in solving black bear depredation problems.

Strategy 3.3. Explore the possibility of using sport hunters for damage control.

Oregon's Cougar Management Plan (ODFW 1993a)

Goals:

- Recognize the cougar as an important part of Oregon's wildlife fauna, valued by many Oregonians.
- Maintain healthy cougar populations within the state into the future.
- Conduct a management program that maintains healthy populations of cougar and recognizes the desires of the public and the statutory obligations of the Department.

Objective 1. Continue to gather information on which to base cougar management.

Strategy 1.1. Continue to authorize controlled cougar hunting seasons conducted in a manner that meets the statutory mandates to maintain the species and provide consumptive and non-consumptive recreational opportunities.

Strategy 1.2. Continue to study cougar population characteristics as well as the impact of hunting on cougar populations.

Strategy 1.3. Continue to update and apply population modeling to track the overall cougar population status.

Strategy 1.4. Continue mandatory check of all hunter-harvested cougar and evaluate the information collected on population characteristics for use in setting harvest seasons.

Strategy 1.5. Continue development of a tooth aging (*cementum annuli*) technique.

Objective 2. Continue to enforce cougar harvest regulations.

Strategy 2.1. Continue to work with OSP to monitor the level of illegal cougar hunting activity.

Strategy 2.2. Implement appropriate enforcement actions and make the necessary changes in regulations to reduce illegal cougar hunting.

Strategy 2.3. Continue to inspect taxidermist facilities and records to discourage and document the processing of cougar hides lacking Department seals.

Objective 3. Document and attempt to eliminate potential future human-cougar conflicts.

Strategy 3.1. Provide information to the public about cougar distribution, management needs, behavior, etc.

Strategy 3.2. Attempt to solve human-cougar conflicts by non-lethal methods.

Strategy 3.3. Consider additional hunting seasons or increased hunter numbers in areas where human-cougar conflicts develop.

Strategy 3.4. Manage for lower cougar population densities in areas of high human occupancy.

Objective 4. Manage cougar populations through controlled hunting seasons.

Strategy 4.1. Base regulation modifications on population trends, as annual fluctuations in the weather can greatly influence recreational cougar harvest.

Strategy 4.2. Continue to regulate cougar hunting through controlled permit seasons.

Objective 5. Continue to allow private and public landowners to take damage-causing cougar without a permit.

Strategy 5.1. No changes will be sought to existing damage control statutes.

Strategy 5.2. Continue to work with landowners to encourage reporting of potential damage before it occurs, with the goal of solving complaints by other than lethal means.

Strategy 5.3. Continue to emphasize that damage must occur before landowners or agents of the Department may remove an offending animal.

Strategy 5.4. Encourage improved livestock husbandry practices as a means of reducing cougar damage on domestic livestock.

Strategy 5.5. Continue to work with other agencies to solve cougar depredation problems.

Objective 6. Manage deer and elk populations to maintain the primary prey source for cougar.

Strategy 6.1. Work with landowners and public land managers to maintain satisfactory deer, elk and cougar habitat.

Strategy 6.2. Evaluate the effects of human activities and human disturbance on cougar.

Strategy 6.3. Take action to correct problems in areas where human access is detrimental to the welfare of cougar or their prey base.

Mule Deer Management Plan (ODFW 1990)

Goals:

- Increase deer numbers in units that are below management objectives and attempt to determine what factors are contributing to long term depressed mule deer populations.
- Maintain population levels where herds are at management objectives.
- Reduce populations in the areas where deer numbers exceed population management objectives.
- Population objectives were set by Oregon Department of Fish and Wildlife Commission action in 1982 and are to be considered maximums.

Objective 1. Set management objectives for buck ratio, population level/density and fawn:doe ratio benchmark for each hunt unit and adjust as necessary.

Strategy 1.1. Over a two or three year period, antlerless harvest will be used to reduce populations which exceed management objectives or to address damage situations.

Strategy 1.2. Harvest tag numbers are adjusted to meet or exceed objectives within 2-3 bucks/100 does.

Strategy 1.3. Population trends will be measured with trend counts and harvest data and may include population modeling.

Strategy 1.4. Update Mule Deer Plan every five years.

Objective 2. Hunter opportunity will not be maintained at the expense of meeting population and buck ratio management objectives.

Oregon's Elk Management Plan (ODFW 1992)

Goal:

- Protect and enhance elk populations in Oregon to provide optimum recreational benefits to the public and to be compatible with habitat capability and primary land uses.

Objective 1. Maximize recruitment into elk populations and maintain bull ratios at Management Objective levels. Establish Management Objectives for population size in all herds, and maintain populations at or near those objectives.

Strategy 1.1. Maintain bull ratios at management objectives.

Strategy 1.2. Protect Oregon's wild elk from diseases, genetic degradation, and increased poaching, which could result from transport and uncontrolled introduction of cervid species.

Strategy 1.3. Determine causes of calf elk mortality.

Strategy 1.4. Monitor elk populations for significant disease outbreaks, and take action when and were possible to alleviate the problem.

Strategy 1.5. Establish population models for aiding in herd or unit management decisions.

Strategy 1.6. Adequately inventory elk populations in all units with significant number of elk.

Objective 2. Coordinate with landowners to maintain, enhance and restore elk habitat.

Strategy 2.1. Ensure both adequate quantity and quality of forage to achieve elk population management objectives in each management unit.

Strategy 2.2. Ensure habitat conditions necessary to meet population management objectives are met on critical elk ranges.

Strategy 2.3. Minimize elk damage to private land where little or no natural winter range remains.

Strategy 2.4. Maintain public rangeland in a condition that will allow elk populations to meet and sustain management objectives in each unit.

Strategy 2.5. Reduce wildlife damage to private land.

Objective 3. Enhance consumptive and non-consumptive recreational uses of Oregon's elk resource.

Strategy 3.1. Develop a policy that outlines direction for addressing the issues of tag allocation to private landowners and public access to private lands in exchange for compensation to private landowners.

Strategy 3.2. Increase bull age structure and reduce illegal kill of bulls while maintaining recreational opportunities.

Strategy 3.3. Adjust levels of hunter recreation in all units commensurate with management objectives.

Strategy 3.4. Identify, better publicize, and increase the number of elk viewing opportunities in Oregon.

Oregon's Bighorn Sheep Management Plan (ODFW 1992)

Goal:

- Restore bighorn sheep into as much suitable unoccupied habitat as possible.

Objective 1. Maintain geographical separation of California and Rocky Mountain subspecies.

Strategy 1.1. California bighorn will be used in all sites in central and southeast Oregon, as well as the Burnt, Deschutes, and John Day river drainages.

Strategy 1.2. Coordinate transplant activities with adjacent states.

Strategy 1.3. Continue to use in-state sources of transplant stock while seeking transplant stock from out of state.

Strategy 1.4. Historic areas of bighorn sheep range containing suitable habitat will be identified and factors restricting reintroduction will be clearly explained for public review.

Objective 2. Maintain healthy bighorn sheep populations.

Strategy 2.1. Bighorn sheep will not be introduced into locations where they may be reasonably expected to come into contact with domestic or exotic sheep.

Strategy 2.2. Work with land management agencies and private individuals to minimize contact between established bighorn sheep herds and domestic or exotic sheep.

Strategy 2.3. Work with land management agencies to locate domestic sheep grazing allotments away from identified present and proposed bighorn sheep ranges.

Strategy 2.4. Maintain sufficient herd observations to ensure timely detection of disease and parasite problems.

Strategy 2.5. Promote and support aggressive research aimed at reducing bighorn vulnerability to diseases and parasites.

Strategy 2.6. Bighorn individuals that have known contact with domestic or exotic sheep will be captured, quarantined, and tested for disease. If capture is impossible, the bighorn will be destroyed before it has a chance to return to a herd and possibly transmit disease organisms to others in the herd.

Strategy 2.7. Bighorns of questionable health status will not be released in Oregon.

Objective 3. Improve bighorn sheep habitat as needed and as funding becomes available.

Strategy 3.1. Monitor range condition and use along with population characteristics.

Objective 4. Provide recreational ram harvest opportunities when bighorn sheep population levels reach 60 to 90 animals.

Strategy 4.1. To reduce possibility of black-market activity, all hunter-harvested horns will be permanently marked by the Department.

Strategy 4.2. Do not transplant bighorns on those areas where some reasonable amount of public access is not possible.

Strategy 4.3. Consider land purchase in order to put such land into public ownership.

Objective 5. Conduct annual herd composition, lamb production, summer lamb survival, habitat use and condition, and general herd health surveys.

- Strategy 5.1. Maintain sufficient herd observations so as to ensure timely detection of disease and parasite problems. This will include mid- to late-summer, early winter, and later winter herd surveys.
- Strategy 5.2. Initiate needed sampling and collections when problems are reported to verify the extent of the problem. Utilize the best veterinary assistance.
- Strategy 5.3. Promote and support an aggressive research program aimed at reducing bighorn vulnerability to disease and parasites.
- Strategy 5.4. Continue to test bighorns for presence of diseases of importance to both bighorn sheep and livestock.
- Strategy 5.5. Monitor range condition and use along with population characteristics.
- Strategy 5.6. Conduct population modeling of all herds.
- Strategy 5.7. Determine herd carrying capacity after consultation with the land manager.
- Strategy 5.8. Investigate lamb production and survival as an indication of a population at carrying capacity.

Oregon Migratory Game Bird Program Strategic Management Plan (ODFW 1993)

Goal:

- Protect and enhance populations and habitats of native migratory game birds and associated species at prescribed levels throughout natural geographic ranges in Oregon and the Pacific flyway to contribute to Oregon's wildlife diversity and the uses of those resources.

Objective 1. Integrate state, federal, and local programs to coordinate biological surveys, research, and habitat development to obtain improved population information and secure habitats for the benefit of migratory game birds and other associated species.

- Strategy 1.1. Establish an Oregon Migratory Game Bird Committee to provide management recommendations on all facets of the migratory game bird program.
- Strategy 1.2. Use population and management objectives identified in Pacific Flyway Management Plans and Programs.
- Strategy 1.3. 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.
- Strategy 1.4. 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.
- Strategy 1.5. Develop a statewide program for the collection of harvest statistics.
- Strategy 1.6. Prepare a priority plan for research needs based on flyway management programs.
- Strategy 1.7. Annually prepare and review work plans for wildlife areas that are consistent with policies and strategies of this plan.
- Strategy 1.8. Develop a migratory game bird disease contingency plan to address responsibilities and procedure to be taken in the case of disease

outbreaks in the state. It will also address policies concerning “park ducks”, captive-reared, and exotic game bird releases in Oregon.

Objective 2. Assist in the development and implementation of the migratory game bird management program through information exchange and training.

Strategy 2.1. Provide training for appropriate personnel on biological survey methodology, banding techniques, waterfowl identification, habitat development, disease problems, etc.

Objective 3. Provide recreational, aesthetic, educational, and cultural benefits from migratory game birds, other associated wildlife species, and their habitats.

Strategy 3.1. Provide migratory game bird harvest opportunity.

Strategy 3.2. Regulate harvest and other uses of migratory game birds at levels compatible with maintaining prescribed population levels.

Strategy 3.3. Eliminate impacts to endangered or threatened species.

Strategy 3.4. Reduce impacts to protected or sensitive species.

Strategy 3.5. Provide a variety of recreational opportunities and access, including viewing opportunities, throughout the state.

Strategy 3.6. Provide assistance in resolving migratory game bird damage complaints.

Strategy 3.7. Develop opportunities for private, public, tribal, and industry participation in migratory game bird programs including, but not limited to, conservation, educational, and scientific activities.

Strategy 3.8. Disseminate information to interested parties through periodic program activity reports, media releases, hunter education training, and other appropriate means.

Objective 4. Seek sufficient funds to accomplish programs consistent with the objectives outlined in the plan and allocate funds to programs based on management priorities.

Strategy 4.1. Use funds obtained through the sale of waterfowl stamps and art to fund all aspects of the waterfowl management program as allowable under ORS 497.151.

Strategy 4.2. Develop annual priorities and seek funding through the Federal Aid in Wildlife Restoration Act.

Strategy 4.3. Solicit funds from “Partners in Wildlife” as appropriate.

Strategy 4.4. Seek funds from a variety of conservation groups such as Ducks Unlimited and the Oregon Duck Hunter’s Association.

Strategy 4.5. Solicit funds from the Access and Habitat Board as appropriate and based on criteria developed by the Board and the Fish and Wildlife Commission.

Strategy 4.6. Pursue funds from other new and traditional sources, such as corporate sponsors and private grants.

Other General Habitat Goals, Objectives and Strategies that might be applicable

Goal:

- Protect and maintain remaining high quality riparian, aquatic, and upland habitats.

Objective 1. Maintain or increase wildlife species diversity.

Strategy 1. Protect, enhance, and restore wildlife habitat in the subbasin.

Strategy 2. Protect federal and state threatened, endangered, and sensitive wildlife species.

Habitat Strategies

- **Grazing:** Develop livestock control measures to include limited grazing periods, reduced stocking rates, temporary or permanent stream corridor fencing, and management of riparian pasture systems.
- **Mining:** Require mining and dredging operations to meet county, state, and federal regulations. Ensure that the Department of Environmental Quality, Environmental Protection Agency, and Oregon Division of State Lands jointly develop guidelines, standards, and enforcement procedures for protection of streambed conditions under provisions of the 1987 amendments to the Clean Water Act, Title III – Standards and Enforcement, Sections 301-310, and 404. Prevent mining activities in or near critical fish habitat.
- **Road Building:** Enforce Forest Service Practices Rules requiring adequate maintenance or closure and rehabilitation of roads. Social, economic, wildlife, fisheries, and recreation factors must be considered and positive road management plans developed to close unnecessary roads and return them into resource production where possible. Examine alternative road construction sites in areas classified as having high erosion and slope failure potential.
- **Timber Harvest:** Develop a system for classifying and mapping forest lands susceptible to erosion, including slope failures, streamside landslides, gully erosion, and surface erosion. Such a system should take into account the potential for damage to downstream resources in addition to the potential for on-site erosion.
- **Timber Harvest:** Require the USFS, BLM, and ODF to increase monitoring of timber harvest activities for compliance with rules, guidelines, and recommendations for habitat protection.
- **Pesticide and Herbicide Use:** Ensure that chemical treatments from federal, state, and private individuals for plant and insect control adjacent to waters in the Burnt River subbasin will not endanger fish life and aquatic organisms or damage watershed and riparian systems.
- **Water Quality and Quantity:** Require the EPA, ODEQ, BLM, and USFS to establish monitoring programs required by the Clean Water Act (Sections 301-310), the National Forest Management Act, and the National Environmental Protection Act (NEPA).
- Require the ODEQ, EPA, and DSL to enforce guidelines, standards, and procedures for protection of streambed conditions under provisions of the Clean Water Act (1987 amended)
- Continue landowner involvement and cooperation in protecting, restoring, and enhancing riparian systems and watersheds.
- Require the DSL to develop procedures and provide manpower to monitor compliance with fill and removal permit conditions.
- Develop acceptable methods of erosion control for necessary bank protection, through agency and landowner cooperation.

- Apply for instream water rights or recommend additional sites for adoption of minimum streamflow by the Water Resources Commission.
- Require all diversion inlets be properly screened and maintained as required by the Fish Screen Law (1987) and ORS 509.615.
- Monitor irrigators to ensure all diversion structures minimally provide adult and juvenile passage as required by state law.
- Obtain funding for landowners through state and federal agencies to implement more efficient irrigation methods and develop water conservation practices benefiting landowners and instream flows.
- Purchase, lease, exchange, or seasonally rent water rights for selected fish habitat during critical low flow periods.
- Develop a comprehensive plan for reintroduction, regulation, and management of beaver in suitable sites in the Burnt subbasin for the specific purpose of using beaver to restore streamflows, improve fish habitat, and improve watersheds.
- Support and expand existing watershed programs.
- Develop a system of riparian natural areas associated with critical fish habitat throughout the basin.

Statement of Fish and Wildlife Needs

The Burnt River subbasin once supported important populations of anadromous fish. These populations were extirpated as a result of hydropower development on the Snake River. This statement of fish and wildlife needs identifies needs within the Burnt River subbasin for restoration, conservation and management of fish and wildlife populations and their habitats. However, issues outside the subbasin, such as passage barriers and habitat on the Columbia and Snake Rivers, need to be addressed even as plans for in-basin restoration and conservation are developed and implemented.

The foregoing subbasin summary includes information regarding the status and condition of fish and wildlife populations and habitat within the subbasin. In synthesizing this information, three general needs for restoration and recovery of fish and wildlife populations and habitat emerge:

- **Monitoring** - Monitoring the status of high priority populations and habitats is important to understanding recovery status and focusing recovery priorities and efforts. Current monitoring efforts should continue and in some cases be expanded to meet emerging information needs;
- **Habitat Restoration** - Cooperative efforts among landowners, resource managers and regulatory agencies to restore watershed function should continue.
- **Evaluation** – Restoration and recovery measures implemented should be evaluated to document their success. An adaptive management approach to implementation should be used to insure activities to meet expectations.

The following provide specific immediate or critical needs developed and submitted by fish and wildlife resource managers and other interested parties within the Burnt River subbasin. This list is not exhaustive as other specific needs may emerge as

species and habitats become better understood and out-of-basin limiting factors are addressed. Needs have been defined to address limiting factors to fish and wildlife, ensure that gaps in current data or knowledge are addressed, enable continuation of existing programs critical to successful management of fish and wildlife resources, and to guide development of new programs to facilitate or enhance fish and wildlife management.

Both aquatic and terrestrial needs have been identified, as well as general needs which apply equally to both aquatic and terrestrial resources. The order in which needs are listed in no way implies priority. It is important to note that aquatic and terrestrial needs are separated here for organizational purposes, and are not perceived to be mutually exclusive. Restoration efforts directed at either aquatic or terrestrial resources are likely to impact the ecosystem as a whole. The extent to which needs are addressed and goals and objectives are achieved is dependent upon available funding and timeliness of the permitting and consultation process.

General Needs

1. Reduce road densities through closure and obliteration to minimize human caused harassment of wildlife.
2. Reduce off-road vehicle use and use of closed roads; restrict ATV use (no cross-country travel) and restrict snowmobile use in big game winter range areas.
3. Protect riparian areas from livestock grazing to restore vegetative cover and improve associated water tables.
4. Protect, enhance, and acquire riparian areas in large riverine valleys with emphasis on old growth cottonwood galleries (land purchases, land trusts, conservation easements, landowner cooperative agreements, exchanges).

Fish / Aquatic Needs

5. Conduct additional studies and analyses to determine potential for restoration of fish passage at dams including Unity, Higgins and Whited dams as well as irrigation diversion dams.
6. Develop and implement, as appropriate, a plan to restore fish passage at dams including Unity, Higgins and Whited dams as well as irrigation diversion dams.
7. Improve / increase stream flows:
 - Provide for water releases from dams as needed to benefit fish.
 - Restore and augment streamflows using (but not limited to) water right leases, transfers or purchases and improved irrigation efficiency.
 - Recreate a more natural hydrograph to enhance and protect fish life histories through improved management of water releases at Unity Dam.
8. Restore instream habitat to natural conditions and protect as much as possible to provide suitable holding, spawning and rearing areas for fish and to avoid future cumulative impacts.
9. Reduce stream temperature, sediment and embeddedness levels to levels meeting appropriate state standards.
10. Investigate and develop priorities for screening diversions.
11. Implement diversion screening, beginning with highest priority diversions.
12. Restore, protect and create riparian, wetland and floodplain areas within the subbasin and establish connectivity.

13. Conduct feasibility analyses to determine potential for restoration of bull trout populations into historic habitat in the subbasin.
14. Develop and implement, if appropriate, a plan to restore bull trout into historic habitats.
15. Continue efforts to educate anglers and the general public as to the importance of bull trout and the need to protect them.
16. Reconnect resident fish populations within the Burnt subbasin through habitat and passage improvements.
17. Reconnect Burnt subbasin resident fish populations with Snake River populations through habitat and passage improvements.

Wildlife / Terrestrial Needs

18. Acquire lands with high priority habitat components (e.g., low elevation forest and forest/rangeland mix habitats) when opportunities arise for improved habitat protection, restoration and connectivity and for mitigation of lost wildlife habitat and/or seasonal range (land purchases, land trusts, conservation easements, landowner cooperative agreements, exchanges).
19. Protect big game summering areas near Whitney from development.
20. Reduce road density in the upper North Fork Burnt River area.
21. Develop and implement management prescriptions to restore and promote late successional forest habitats with emphasis on low elevation, ponderosa pine type.
22. Improve understory condition on deer winter range.
23. Protect, restore and create wetland and riparian habitat, especially in lower elevation riparian areas such as those in the Whitney and Burnt River valleys.
24. Reduce the spread of non-native vegetation through chemical and biological control methods.
25. Develop and use restoration techniques for noxious weed infested communities.
26. Improve access to private lands south of the Burnt River for hunters.
27. Improve access to private lands south of the Burnt River for wildlife damage management.
28. Retain all large diameter (>20" dbh) ponderosa pine, cottonwood, fir, and western larch snags.
29. Complete mitigation agreements for remaining habitat unit losses due to construction and inundation of the Lower Snake River dams. These agreements should equal 200% of the habitat unit losses (NWPPC 1995 Fish and Wildlife Program).
30. Conduct an assessment of direct operational impacts of Lower Snake River dams on wildlife habitat as called for in Section 7 of the NWPPC's 2000 Fish and Wildlife Program.
31. Mitigate for direct operational and secondary losses of wildlife habitat from the Lower Snake River dams.

Burnt Subbasin Recommendations

Projects and Budgets

There have been no projects proposed for funding in the Burnt River subbasin during the Fiscal Year 2003- 2005 funding cycle

Continuation of Ongoing Projects

There are no ongoing BPA-funded projects in the Burnt River subbasin.

New Projects

No new projects have been proposed for the Burnt subbasin in FY 2003 – FY 2005.

Needed Future Actions

Although research and restoration activities have been and continue to be undertaken by landowners and local groups, there are no proposed or ongoing BPA-funded projects in the Burnt subbasin. Thus, action is needed in research, monitoring and restoration to fully restore fish and wildlife populations and their habitats within the Burnt subbasin. Future action will be necessary to satisfy subbasin goals and objectives and to address the limiting factors and fish and wildlife needs identified in the foregoing Subbasin Summary (Pp 54, 34 and 69 respectively). Some of those continuing needs are outlined below.

The most critical needed future action is protection and restoration of terrestrial and aquatic habitats for the benefit of a variety of ESA and non-ESA fish and wildlife species. There is a need to develop a process for evaluating and selecting priority habitat projects. There is a need to develop mechanisms to effectively and efficiently secure and fund these habitat projects. There is a need to develop new partnerships with private landowners, soil and water conservation districts (SWCDs), watershed councils, local governments, and other interested parties within the Burnt subbasin. These partnerships would help accomplish habitat protection and restoration actions through conservation easement, fee-title purchase, long-term lease and cooperative management agreement. There is a need for BPA to provide funding for such projects to mitigate for the effects of the Columbia Basin Federal Hydropower System on Burnt subbasin fish and wildlife. There is a need to assess and mitigate hydrosystem operational impacts to fish and wildlife and their habitats. There is a need to improve water quality and fish screening, and to control noxious non-native vegetation. There is continued need to restore flows to improve the quantity and quality of fish habitat and improve fish passage.

There is a need to reintroduce fish species that have been extirpated from the subbasin and augment populations of species that are in decline or in peril of becoming extirpated. There is a need to address out-of-subbasin as well as within-subbasin fish passage barriers and the feasibility of reintroducing anadromous fish to the subbasin should those barriers be removed.

There is a need for research, monitoring and evaluation (RME) in all facets of natural resource restoration, enhancement and protection. Ongoing RME is important for ensuring work plan compliance and effectiveness. Ongoing RME is necessary to assess trends and determine success in restoration efforts, particularly at the watershed level. RME is needed to help demonstrate both habitat and species response to habitat protection and restoration actions. There is a continuing need to document life history, distribution and habitat needs of high-priority fish and wildlife species and the effect of exotic species on native fish, wildlife and plants. There is a need for on-going inventories of limiting factors to help plan and prioritize future actions. For example, inventories of upland habitat conditions, fish and wildlife population distributions, spread of invasive weeds, and location and status of wetland areas may be used to adapt management actions. There is a need for consistency in data collection and a shared repository where data can be accessed by all subbasin entities. Continuation and enhancement of the cooperative approach in RME will facilitate restoration and enhancement measures.

There is a need to ensure compliance with natural resource laws, codes and ethics through improved enforcement efforts and public education.

Actions by Others

There is a need for BPA to partner with state, federal, county and local entities, tribes, and private landowners to protect and restore fish and wildlife and their habitats within the Burnt subbasin. There is a need to take advantage of opportunities raised by landowners willing to enter into conservation easement agreements, fee-title acquisitions, long-term leases, and cooperative management agreements in areas of critical habitat.

There is a need to develop interstate and interagency cooperative initiatives to prevent the introduction and spread of terrestrial and aquatic nuisance species. Plans, initiatives, and agreements among agencies need to be suitably designed and monitored (i.e., weed spraying programs should be coupled with reseeding efforts, etc.) and should acknowledge and incorporate the experience and successes of private land managers. The public needs to become more aware of the ability of many non-native species to out-compete native species. Public outreach and education could occur through schools, SWCDs, watershed councils, sporting groups and agencies. Cost-sharing arrangements with BPA would be appropriate.

There is a need to foster grassroots support to implement conservation measures on private lands. Agencies could help private groups acquire grants; assist with project design and implementation; and facilitate cost-share arrangements, grants, rehabilitation / enhancement efforts, and the promotion of conservation activities. Agencies need to develop and/or implement other land and resource management plans, research the effectiveness of conservation programs and activities, and encourage the securing of management rights (including the use of conservation easements and land acquisitions) to improve water quality and fish and wildlife habitat in the subbasin. Workshops could be provided to demonstrate methods of water conservation and techniques for protecting and restoring riparian areas and wetlands. Such improvements may reduce sedimentation, increase density and diversity of riparian vegetation, improve channel form, and improve water quality.

There is a need to investigate and mitigate the impacts associated with transportation corridors. State departments of transportation and county road programs should identify and mitigate impacts to wildlife movement, mortalities, and soil permeability. These agencies and programs especially need to address channel confinement, culverts and related fish/wildlife impediments. States should identify and adequately mitigate cumulative impacts associated with new highway construction, improvement, or expansion projects. There is a need to increase effort by management agencies to reduce road densities, implement closures of existing roads on public lands and enforce road closures.

There is a need for increased protection of water resources through reduction/elimination of point sources of pollution and voluntary adherence to, or enforcement of, allowable water rights. Many streams in the Burnt subbasin are over allocated, leaving little or no instream water for fish and wildlife during low water periods. A review of water rights and use relative to availability may allow opportunities to provide flows to improve the quality and quantity of aquatic habitat. Irrigation systems and diversions need to be inventoried and facilities improved to allow for more efficient use of water and for fish passage. There is also a need to develop off-stream water sources for livestock near critical aquatic habitats.

BPA-funded actions need to be more closely coordinated with the actions of city, county, state, and federal agencies and other organizations that are directed at benefiting fish and wildlife and their habitats. Agencies need to investigate, document, and monitor population trends and develop coordinated recovery plans for high-priority management species and other species that show declining populations.

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