APPENDIX 1

GUIDING CONCEPTS AND LEGISLATION

PROPER FUNCTIONING CONDITION

Source--Riparian Area Management: Process for Assessing Proper Functioning Condition. T-1737-0. BLM 1993, Revised 1995.

The first goal of the Malheur/Owyhee Watershed Council (MOWC) refers to the proper functioning condition of a watershed. A healthy watershed collects, stores, and releases water in a beneficial manner. Healthy uplands collect rain and snowmelt, store the moisture in the soil, and release it gradually into streams. Functioning condition results from the interplay among geology, soil, water, vegetation, and use of the area by grazing/browsing herbivores.

Streams are considered to be in "Proper Functioning Condition" (PFC) when adequate vegetation, land form, or large woody debris is present to:

- Dissipate stream energy during high water flows, thereby, reducing soil erosion and improving water quality;
- Filter and capture sediment;
- Improve floodwater retention and groundwater recharge; and
- Develop root masses that stabilize streambanks to reduce erosion.

Other categories include "functional-at-risk" and "non-functional" streams. Functional-at-risk streams are in functional condition but an existing characteristic (soil, water, vegetation, or management) makes them susceptible to degradation. Non-functional streams clearly are not able to dissipate stream energy associated with high water flows.

The PFC of a stream is always determined relative to the capability and potential of that stream. The potential is the highest ecological status an area could achieve, given no political, social, or economic constraints. The capability is the highest ecological status achievable given the constraints. These constraints can include road next to stream, upstream dam discharge, or historical channelization that cannot be reversed due to adjacent row cropping. According to Wayne Elmore, leader of the National Riparian Service Team, this means that standards can be set for a proper functioning canal, which is what much of the lower basin contains.

To determine the functional condition, an interdisciplinary team evaluates the stream based on its capability and potential. The Bureau of Land Management (BLM) and the US Forest Service (USFS) have both identified PFC as the minimum standard for streams under their management. Natural Resource Conservation Service (NRCS) has also

adopted this evaluation protocol. However, the method is controversial due to the lack of "hard numbers" that people are used to seeing, instead, it relies on the professional judgment of the interdisciplinary team.

TAYLOR GRAZING ACT

The Taylor Grazing Act of 1934 was a major step toward protecting public land and its resources by providing for the orderly use, improvement, and development of the range. Following various homestead acts, the Taylor Grazing Act established a system for the allocation of grazing privileges based on grazing capacities, priorities of use, and for delineation of allotment boundaries; it also established standards for rangeland improvements and implemented grazing fees. The act removed 142 million acres of land in western states from the potential for sale and placed it under the jurisdiction of the Grazing Service, which evolved into the BLM in 1946.

BLM collects grazing fees under the Taylor Grazing Act of 1934. Permits are issued within designated grazing districts. Collections from these permits are distributed as follows: 50% to the Range Improvement Fund for appropriation in the following year, 12.5% to the State of Oregon for subsequent distribution to the counties, and 37.5% to the Federal Treasury.

FEDERAL LAND POLICY AND MANAGEMENT ACT

The Federal Land Policy and Management Act (FLPMA) in 1976 declared that public land would be retained in federal ownership and be managed in recognition of the nation's need for domestic sources of minerals, food, timber, and fiber. Management would be based on the principles of multiple use and sustained yield. Congress acknowledged the need to receive fair market value for the use of public land. As mandated in FLPMA and in the Public Rangelands Improvement Act (PRIA) of 1978, a portion of the grazing fee is invested in range improvements, which benefit wildlife, watersheds, and livestock production.

WILDERNESS STUDY AREAS

The BLM was mandated in 1976 through FLPMA to review public lands for possible wilderness designation and to offer recommendations. In November 1980, BLM in Oregon designated Wilderness Study Areas (WSA's). A WSA is a parcel of public land determined through intensive inventories to possess certain wilderness characteristics as described in the 1964 Wilderness Act. On October 7, 1991, the President received the BLM's Wilderness Study Report for Oregon. In 1992, the President submitted his recommendations to Congress, which has the authority to designate wilderness. For Oregon, the President's wilderness recommendations were the same as the BLM's recommendations.

Congress has no deadline to make decisions on wilderness designations. Until Congress acts on the wilderness recommendations or otherwise releases WSA's for other purposes, WSA's are managed so as not to impair their suitability for preservation as wilderness, in accordance with BLM's Interim Management Policy for Lands Under Wilderness Review and other applicable laws and policies.

FEDERAL CLEAN WATER ACT

In 1972, Congress passed the Clean Water Act (CWA) to make the nation's waters "fishable, swimmable, and drinkable." It primarily targeted point sources of pollution—generally, pipes that discharged industrial or municipal wastes into waterways. The CWA required National Pollution Discharge Elimination System (NPDES) permits that indicate "acceptable" levels of pollutants in the discharges from all point sources, so most of them comply with water quality standards. Nonpoint source pollution is now the main focus. Nonpoint source pollution consists of runoff from sources such as lawns, roads, parking lots, construction sites, clear-cuts, mines, croplands, livestock corrals, and feedlots, and ungulate use of open rangeland.

The CWA also mandated that States designate beneficial uses for each water body and adopt water quality standards that measure how well those uses are supported. For example, the beneficial use of "water contact recreation life" can be monitored through standards for aquatic weeds or algae, bacteria, chlorophyll a, nutrients, or pH. Standards are typically designed to protect the most sensitive beneficial use within a water body.

The following beneficial uses have been established for the Malheur basin by the state Department of Environmental Quality. (DEQ)

Beneficial Uses for the Malheur Basin

Irrigation	Other Aquatic Life
Livestock Watering	Wildlife
Cold Water Fish	Water Contact Recreation
Warm Water Fish	Aesthetic Quality
Domestic Water Supply	Municipal Water Supply
Industrial Water Supply	Mining

DEQ is required to, at a minimum, assemble and evaluate "all existing and readily available water quality related data and information." These data are then used to determine how well beneficial uses are being supported.

Each state submits a 305(b) report to Congress every two years to report how well streams meet those standards. Section 303(d) of the CWA requires states to identify those waters ("water-quality limited") for which existing required pollution controls are not stringent enough to achieve that state's water quality standards. For these waters, states are required to establish Total Maximum Daily Loads (TMDL's) according to a

priority ranking. The US Environmental Protection Agency (EPA) delegated authority to implement the CWA in Oregon to the DEQ. Federal agencies are responsible for water quality on lands they manage; they are required to meet water quality standards, monitor activities to assure that they meet standards, report results to the State of Oregon, and meet periodically to re-certify best management practices.

OREGON LEGISLATION

Oregon has adopted an anti-degradation standard that incorporates federal policies. In general, the federal policies and state standard require that water quality be maintained for beneficial uses. Waters are not allowed to violate water quality standards or fall below the level required for beneficial uses.

In 1987, Oregon created the Governor's Watershed Enhancement Board (GWEB). Its purpose is to educate people about watershed issues and provide technical assistance and grants for projects.

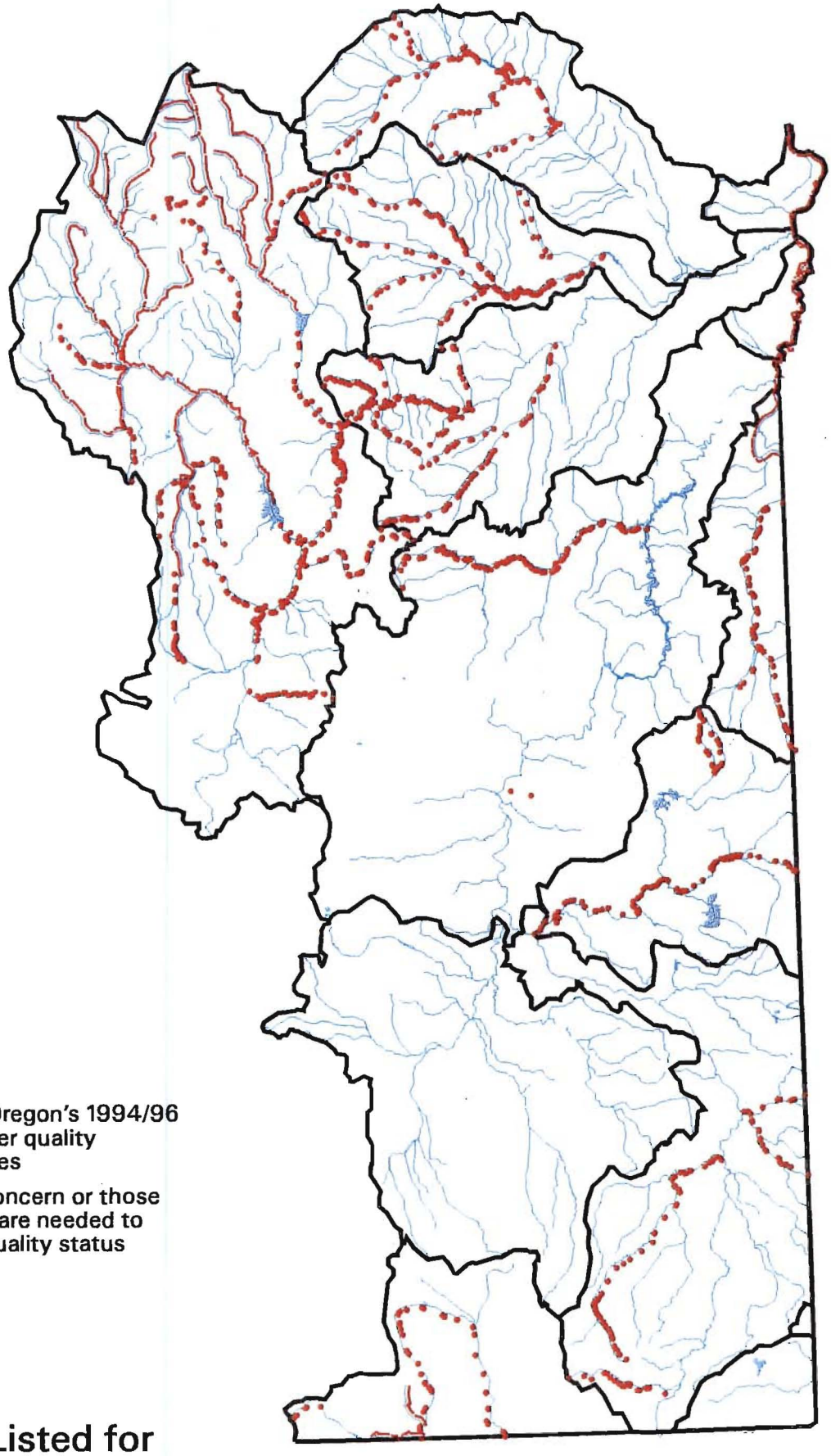
In 1993, SB 1010 was passed by the state. It provides a mechanism for the state to fulfill its mandate under the Clean Water Act. It directs the Oregon Department of Agriculture (ODA) to work with local management agencies, such as SWCD's and watershed councils to reduce agricultural pollution. If a stream is on the 303(d) list, you need to develop a plan to deal with the pollution source. The plan, when approved by DEQ and EPA, is enough to get you off the list whether or not you meet the water quality standards at the time.

In 1995, HB 3441 was passed and it guides the establishment of watershed councils. The councils are voluntary and represent a balance of interested and affected persons within the watershed. They are local, non-regulatory, non-governmental entities with members appointed by county courts; the state has no authority over membership or activities. Councils develop local solutions for local issues. Council members work with agencies to assess resource condition, define short-term and long-term goals, and develop an action plan.

IMPLICATIONS FOR WATER QUALITY

Maps showing the listed waterbodies for temperature, bacteria, toxics, dissolved oxygen, and flow modification are located following page 1-4.

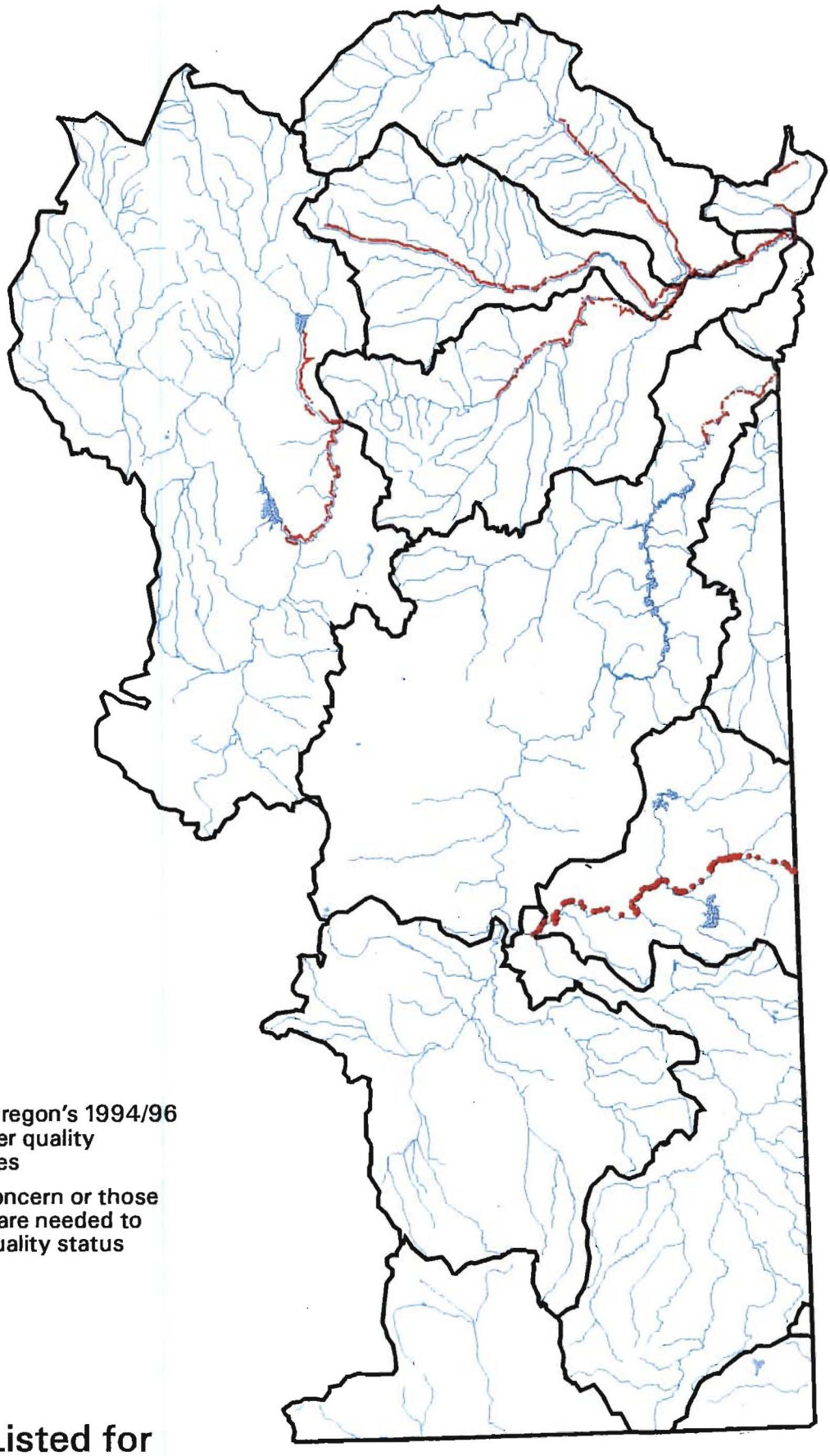
In 1997, the Malheur River's nutrient levels were measured from the river's outlet into the Snake River at Ontario upstream in river miles to the headwaters. Results of the data are located in Table 1-1. River Mile 0 is located at the mouth of the Malheur and River Mile 120 is located in the headwater. As the chart indicates, a relative unpolluted condition existed in the upper reaches of the Malheur River in 1997 (based on one month's sample.)



Waterbodies on Oregon's 1994/96 303(d) list of water quality limited waterbodies

Waterbodies of concern or those where more data are needed to establish water quality status

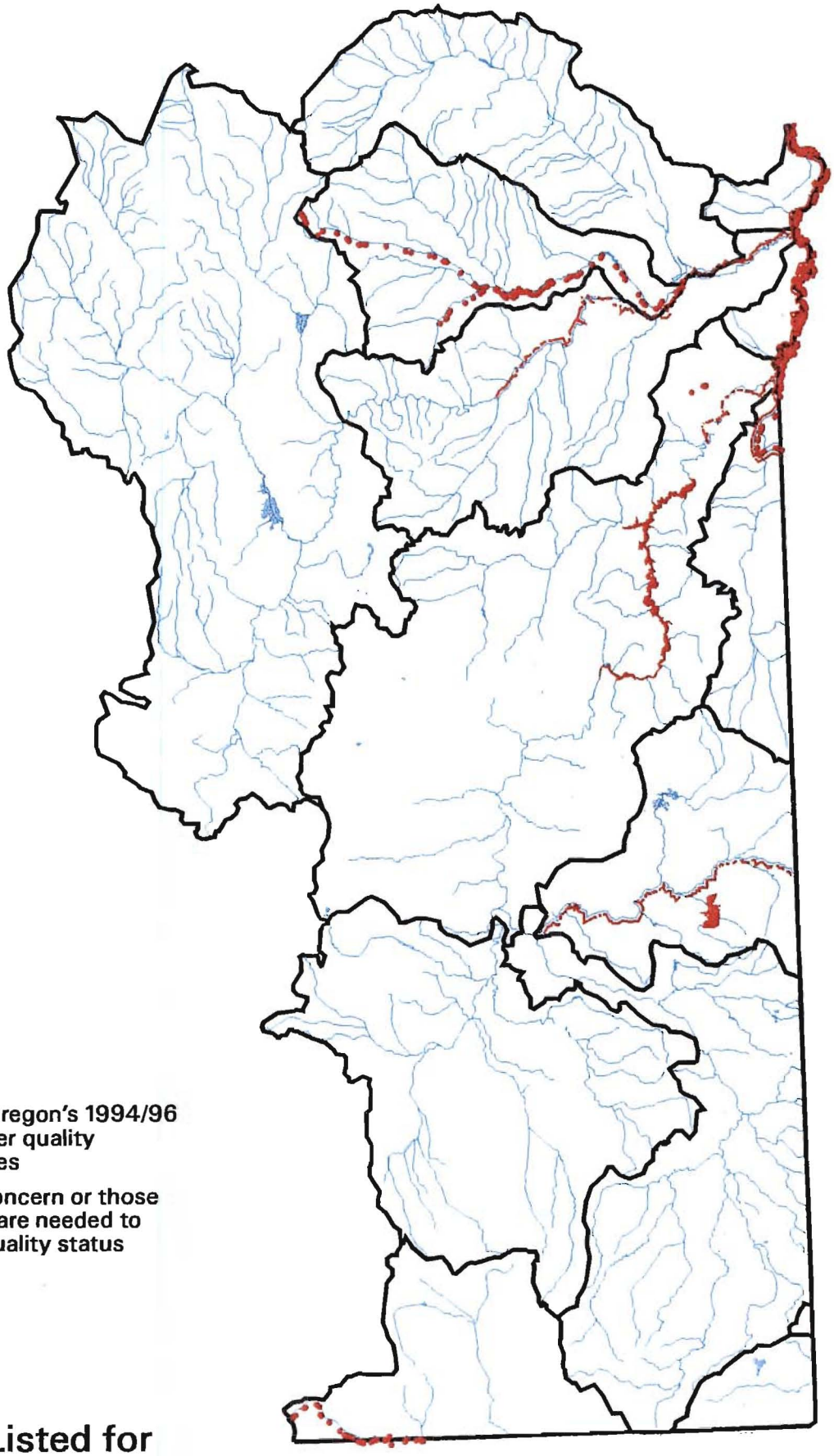
Waterbodies Listed for Temperature



Waterbodies on Oregon's 1994/96 303(d) list of water quality limited waterbodies

Waterbodies of concern or those where more data are needed to establish water quality status

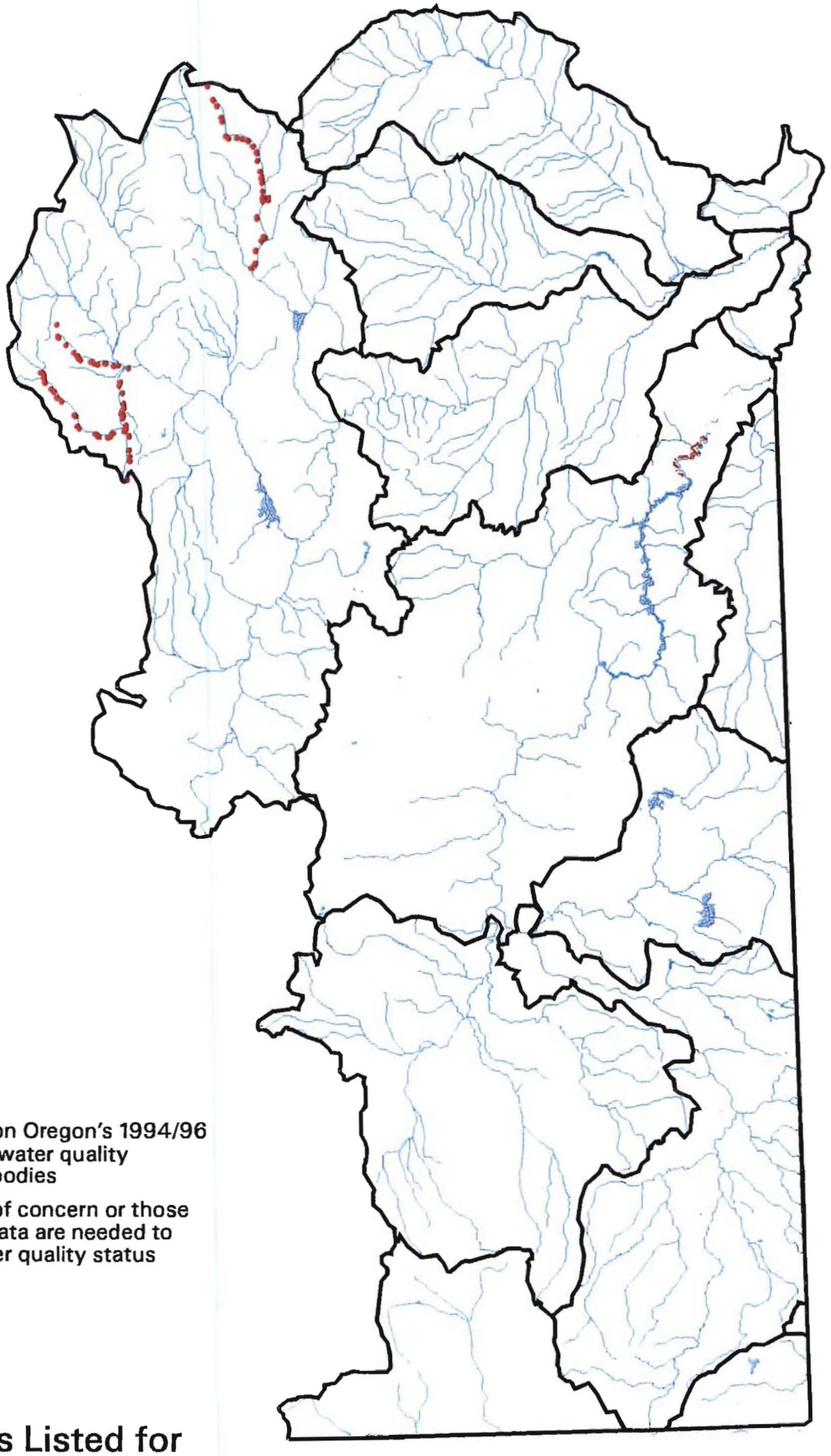
Waterbodies Listed for Bacteria



Waterbodies on Oregon's 1994/96 303(d) list of water quality limited waterbodies

Waterbodies of concern or those where more data are needed to establish water quality status

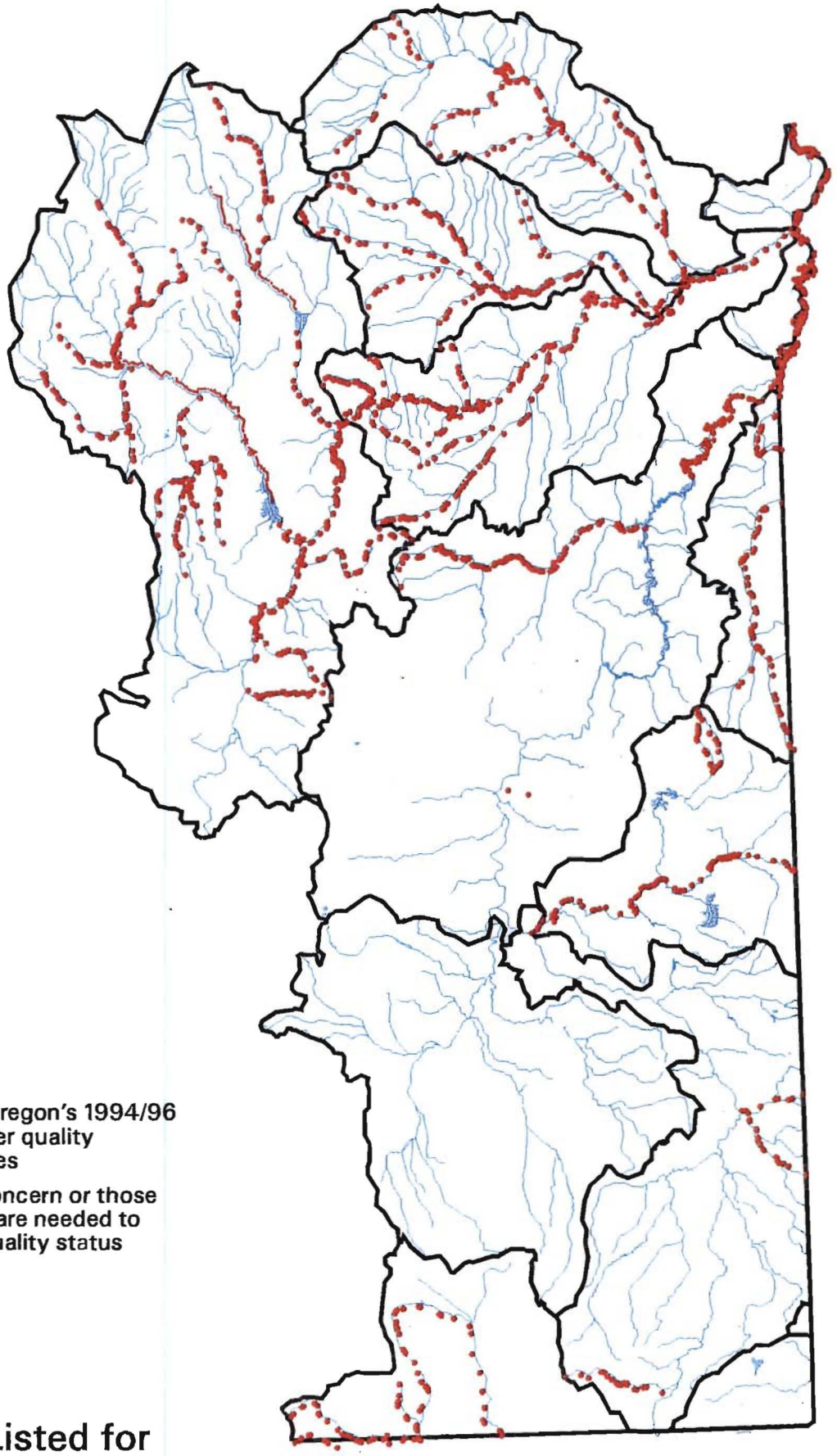
Waterbodies Listed for Toxics



Waterbodies on Oregon's 1994/96 303(d) list of water quality limited waterbodies

Waterbodies of concern or those where more data are needed to establish water quality status

Waterbodies Listed for Dissolved Oxygen

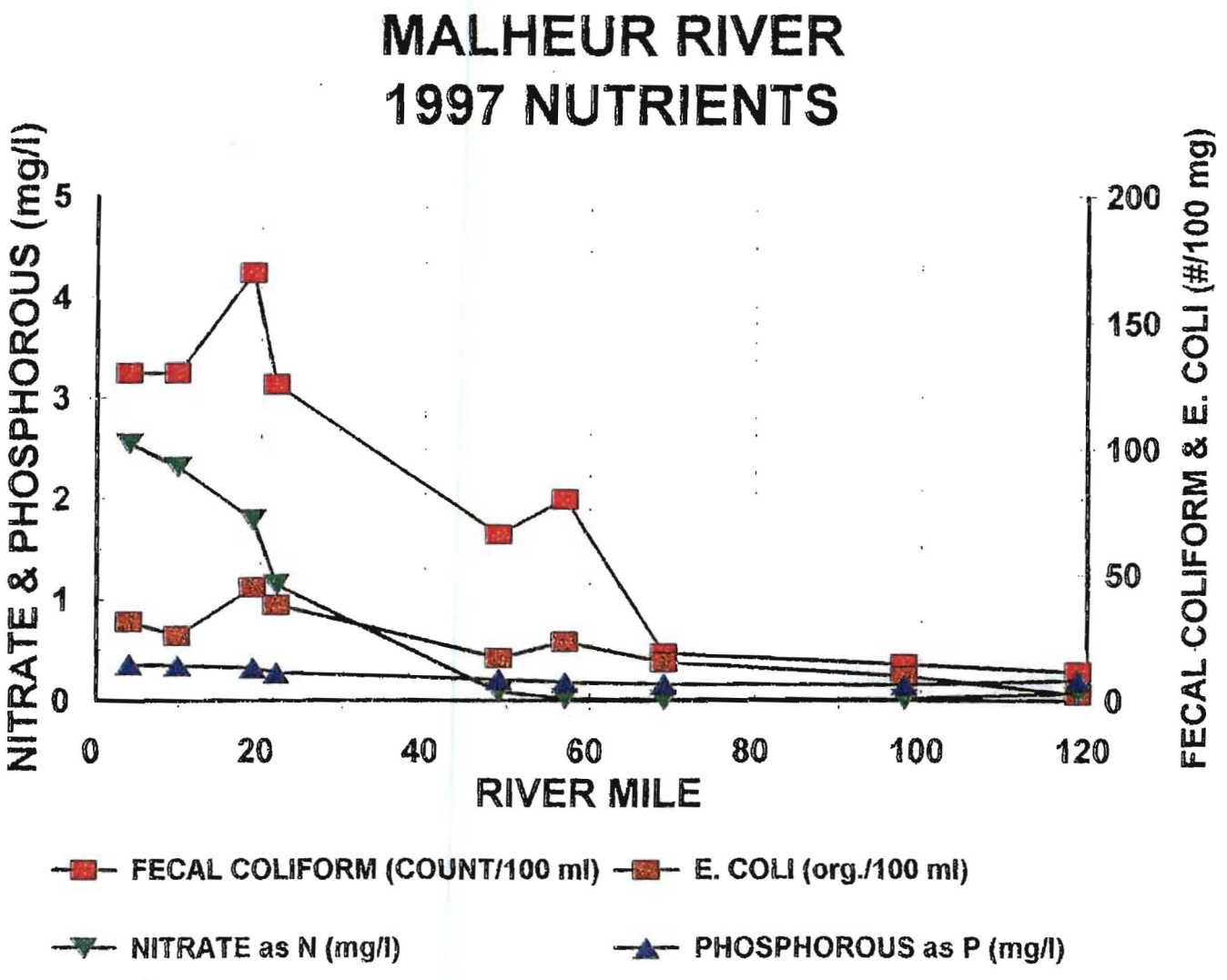


Waterbodies on Oregon's 1994/96 303(d) list of water quality limited waterbodies

Waterbodies of concern or those where more data are needed to establish water quality status

Waterbodies Listed for Flow Modification

Table 1-1


MALHEUR RIVER
1997 NUTRIENTS
NITRATE & PHOSPHOROUS (mg/l)
FECAL COLIFORM & E. COLI (#/100 mg)
0
1
2
3
4
5
0
50
100
150
200
0
20
40
60
80
100
120
RIVER MILE
FECAL COLIFORM (COUNT/100 ml)
E. COLI (org./100 ml)
NITRATE as N (mg/l)
PHOSPHOROUS as P (mg/l)

WILD HORSE LEGISLATION

The Wild Free-Roaming Horse and Burro Act of 1971 states that "it is the policy of Congress that wild free-roaming horses and burros shall be protected from capture, branding, harassment, or death; and to accomplish this they are to be considered in the area where presently found as an integral part of the Public Lands." Appropriate management levels within each Herd Management Area are established to ensure that public land resources, including wild horse habitat, are maintained in satisfactory, healthy condition.

WILD AND SCENIC RIVERS

In 1968, Congress established the National Wild and Scenic Rivers System to preserve and protect selected free-flowing rivers that have outstanding/remarkable values.

A wild river is defined as a section of river that is free-flowing and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted.

A scenic river is a river or section thereof that is free-flowing, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

WATER RIGHTS

In Oregon, all water is publicly owned. The laws pertaining to the use of surface water and groundwater are based on the principle of prior appropriation and limited to the quantity of water needed to satisfy the specified beneficial use without waste. That is, the first person to obtain a water right will be the senior holder on a particular stream and have priority over all junior claims in times of water shortage. Permits are obtained from the Oregon Water Resources Department.

The State of Oregon recognizes instream water rights for the public benefit to maintain sufficient flows to protect recreation, fish, wildlife, and other river-related resources. Instream water rights are applied by the Oregon Department of Environmental Quality, Parks and Recreation, and Fish and Wildlife to the State's Water Resources Commission. The priority date for instream water rights is the date the application is submitted to the Water Resources Department. The Water Resources Department holds the instream water right for the citizens of Oregon.

APPENDIX 2

SOILS

Soils in the semi-arid basin areas are generally young, thin, and poorly developed. Chemical and biological soil-building processes proceed slowly in this environment. Because soil recovery processes are slow, disruption of soils can lead to long-term changes in ecological condition and productivity. Distribution of the major soils in each division is summarized in Table 2-1, along with a brief discussion. (Oregon's Long-Range Requirements For Water, General Soil Map Report Malheur River Drainage, 1969.)

Table 2-1

Key to Soils Related to Physiographic Areas
(Refer to map following page 2-4)

A. Low elevation terraces and flood plains (mostly irrigated)

Fairly level recent alluvial flood plains, fans, and low terraces

Surface color and subsoil texture

Deep, well drained soils

Moderately dark, silt loam ..... Powder
Moderately dark, silt loam ..... (Gi)
Dark, silt loam ..... Jett
Light, Silt Loam (diatomaceous) ..... Bully
Light, loamy sand ..... Feltham
Light, silt loam ..... Garbutt

Alkali, somewhat poorly drained soils

Light, silt loam ..... Umapine
Light, silt loam (moderately deep over hardpan) ..... Stanfield

Alkali, poorly drained soils

Moderately dark, silty clay loam ..... (Ki)
Moderately dark, silty clay loam ..... (Sm)

Broad, nearly level to rolling terraces

Depth and subsoil texture

Soils without hardpan

Deep, silty clay loam ..... Greenleaf
Deep, silt loam ..... Nyssaton

Soils with hardpan

Moderately deep, silt loam ..... Nyssa
Moderately deep, silty clay loam (alkali) ..... (Ma)
Moderately deep, silty clay loam ..... Virtue
Shallow, silt loam ..... Frohman
Shallow, silty clay loam (stony) ..... Gacey
Shallow loam ..... Unit 55
Shallow, clay loam-clay ..... Unit 56

B1. Rolling to hilly grass-shrub uplands

Soils over weakly or non-consolidated old sediments

Deep, clay loam ..... Encina
Moderately deep, clay loam ..... Unit 60
Moderately deep, silty clay ..... Poall
Shallow over hardpan, silty clay ..... (Bi)
Moderately deep, clay loam ..... Brogan
Deep, silt loam (wind deposited) ..... Unit 79
Deep, sandy loam (wind deposited) ..... Unit 51

Soils on fans derived from old sediments (deep, light colored)

Silty, clay loam (alkali) ..... (Mc)
Clay loam ..... (Sp)

Soils over shale

Moderately deep, silty clay ..... Locey
Deep, loam ..... (Bs)

Soils on fans derived from shale

Deep, clay loam ..... Morfitt

Soils over quartz diorite

Moderately deep, loam ..... (Pe)

Soils over basalt, tuff, and rhyolite
Light colored, shallow, stony soils

Subsoil texture

Loamy, very stony ..... Ruckles
Loamy, very stony ..... Unit 75
Loamy, very stony (very shallow) ..... Bakeoven
Loamy, (very shallow and stony) ..... Unit 77
Clayey, very stony ..... Unit 76
Clayey, somewhat stony ..... Unit 76L
Clayey, extremely stony ..... Unit S76

Dark colored soils at higher elevations and on north slopes

Moderately deep, silty ..... Unit 82
Shallow, loamy to clayey (very strong) ..... Unit 83
Very shallow, loamy (rocky) ..... Unit 84

Soils on old fans derived from basalt (light colored, very stony soils)

Clayey, moderately deep over hardpan ..... Lookout

B2. Small stream bottom lands and basins in the uplands

Well drained soils

Deep, loamy ..... Unit 1
Moderately deep over gravel, loamy ..... Unit 3
Shallow over basin sediments, silty ..... Unit 26
Shallow over hardpan, loamy ..... (Bg)

Deep, somewhat poorly drained soils

Silty, non-alkali ..... Unit 10
Silty, alkali ..... Unit 43
Clayey, alkali ..... Unit 42
Clayey, non-alkali ..... Unit 31

Deep, poorly drained soils

Silty, non-alkali..... Unit 15

C. Forested uplands

On steep slopes

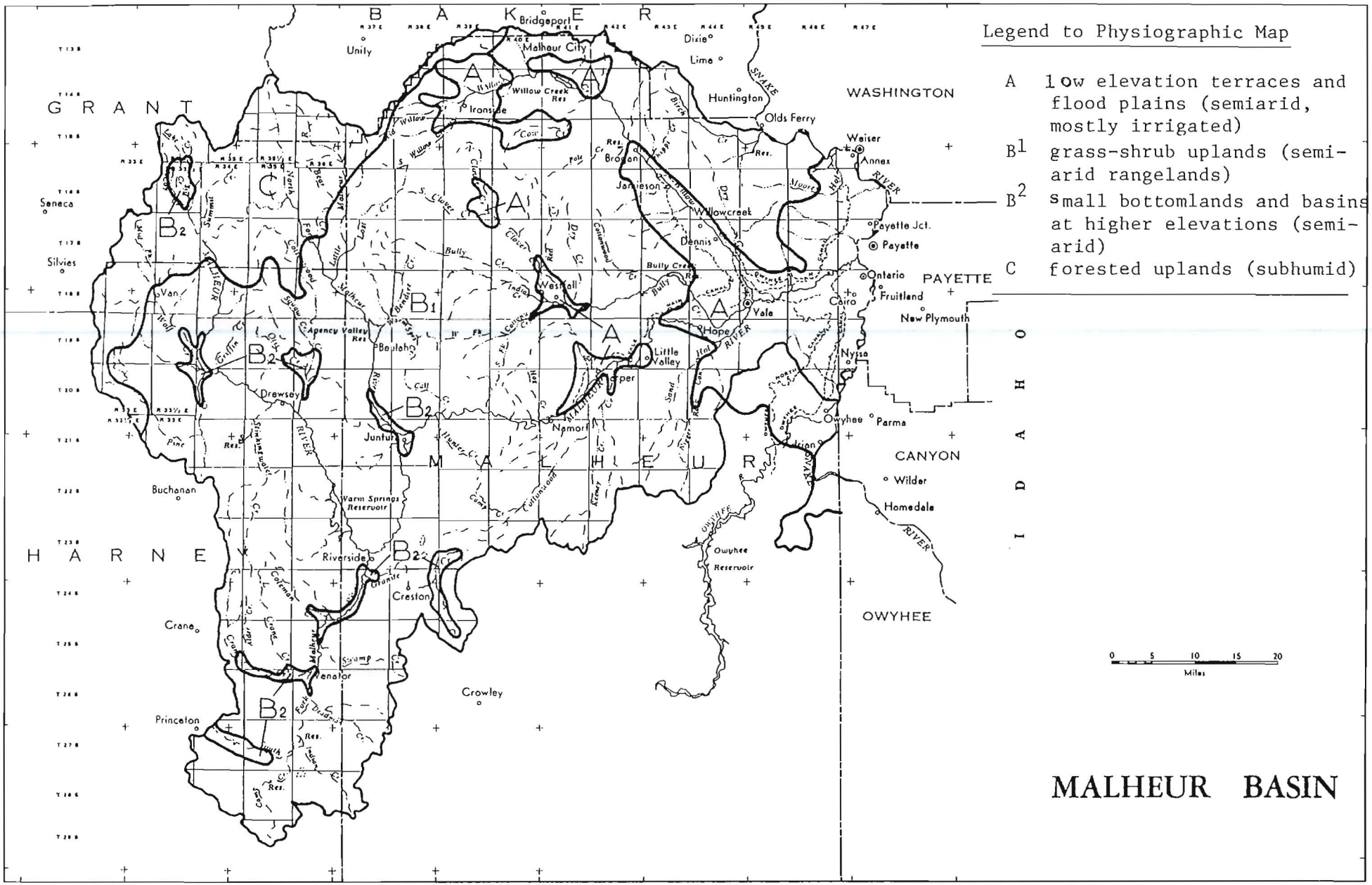
Moderately deep, reddish brown
Stony silty clay loam .....Klicker

LOW-ELEVATION TERRACES AND FLOOD PLAINS (mostly irrigated, arid)

(Malheur Drainage Basin General Soil Map Report, Agricultural Experiment Station, Oregon State University, US Department of Agriculture, Soil Conservation Service and Oregon Water Resources Board, 1969)

Flood plain soils include the well-drained Jett, Powder, Bully, Feltham, Garbutt, and unnamed (Mc) and (Gi) series. Jett, Powder and (Gi) soils are moderately dark, neutral, and medium textured. Bully soils form in alluvium from diatomaceous sources; they are light colored, have a low bulk density, and are easily eroded. (Mc) soils are light colored, clayey soils high in alkali, that are formed on fans derived from uplands of lacustrine sediments. Coarse-textured Feltham soils and medium-textured Garbutt soils occur near the Snake River. The Stanfield, Umapine, (Ki), and (Sm) series are alkali soils with impeded drainage. (Ki) and (Sm) are darker colored and fine textured. Stanfield and Umapine are light colored and medium-textured. Stanfield soils have a cemented pan within 40 inches of the surface. Flooding occasionally occurs in some areas but it is not a major hazard in this basin. Some of the alkali soils have been reclaimed while other areas are still in greasewood.

The broad, silt mantled terraces west of the Snake River have soils of the Nyssa, Nyssaton, (Ma), Greenleaf, and Frohman series. The lower level terraces are relatively undissected and are underlain by very deep stratified, silty and sandy lacustrine sediments. Nyssaton and Greenleaf soils occur on these lower terraces. The higher terrace levels are more dissected and sloping. They have soils of the Nyssa series, with a weak hardpan, and the (Ma) series, with a clayey subsoil and strong cemented hardpan. The latter soils are alkali-affected and often occur in a complex pattern of "slick spots" interspersed with Nyssa soils. The highest terrace levels, as well as terraces along Willow Creek, are mostly underlain by gravel. The medium-textured Frohman series with a shallow hardpan and the Virtue series with a fine-textured subsoil over a hardpan occupy these terraces. Small areas of shallow, stony Gacey soils are associated with the Virtue series near Malheur City. Many areas of the higher terraces are outside of irrigation projects.



Map of Physiographic Areas, Malheur Basin

Land leveling and shaping have been carried out extensively with Nyssa, Greenleaf, and Nyssaton soils on terrace levels underlain by sediments. Deep plowing is beneficial with (Ma) and Nyssa soils, as well as with Virtue soils, where not underlain by gravel. This practice breaks the hardpan and increases permeability and soil depth. Frohman soils are shallow to gravel and are not suited to shaping or deep plowing. Reconnaissance Units 55 and 56 are shallow soils with silica-cemented hardpans and have fine loamy and clayey subsoils respectively. These units occur on sloping old fans and terraces scattered throughout the basin. These soils have no history of farming, but they could probably be improved for irrigation by subsoiling or deep plowing. Units 51 and 79 are deep, sandy, and silty soils, formed in wind-deposited materials.

GRASS-SHRUB UPLANDS (semiarid, rangeland)

Uplands of the Malheur basin consist mainly of rolling, hilly, grass-shrub covered terrain underlain by old lacustrine sedimentary formations of Tertiary age and Tertiary to Recent age lava flows. A thin surface mantle of wind-born loess is present in places, and narrow alluvial lands occur along streams. A few small basins are present in the uplands. The soils are light colored, low in organic matter, and generally calcareous. At higher elevations above 3500 feet, soils are generally darker.

Old lacustrine sediments are exposed throughout the basin between the 2000 to 5000 foot elevations. The Drewsey, Juntura, Ironside, Harney, Payette, and Idaho formations are represented. The sedimentary beds are stratified, unconsolidated or semi-consolidated sand, silt, and clay with some diatomaceous earth and tuffaceous materials. Soils of the Encina, Poall, (Bi), and Brogan series and Reconnaissance Units 60 and 79 are found on these sediments. Encina soils are moderately fine textured, and Poall soils are fine-textured. (Bi) soils are fine textured and shallow over a hardpan. Morfitt soils are developed on fans and foot slopes below areas of Encina and Brogan soils. Reconnaissance unit 60 includes soils similar to Encina, but soils like Poall are also included. Some areas of bare eroded sediments are mapped as reconnaissance land units (Unit 94, if on low slopes, or Unit 98, if steep.)

Lava flows occur mostly as cap rock overlying the older sedimentary formations, with dikes and stocks exposed in many places. Recent intra-canyon basalt flows occur along the South Fork of the Malheur River. Thickness of the lava varies from a few feet of cap rock to sections hundreds of feet thick underlying plateaus. Basalt and rhyolite are both represented, but basalt predominates. Lava flow-rock underlies most of the terrain above 4000 feet, but it occurs in a lesser amount throughout the basin. Shallow, stony soils predominate in areas underlain by lava. Wind-deposited silt is present to some degree in most of these soils.

Light-colored, loamy, very stony soils of the Bakeoven and Rukles series are, respectively, very shallow and shallow over basalt. Lookout soils are stony, fine-textured soils formed on large fans in material derived largely from basalt. They have silica-cemented hardpan at a depth of 20 to 40 inches. Reconnaissance Units 75 and 76 are fine loamy and clayey soils, respectively. They are light colored, very stony, and less than 20 inches deep over basalt, tuff, or rhyolite bedrock. A thin silica-cemented hardpan is often present immediately above bedrock. Units 75L and 76L are similar to Units 75 and 76, but are less stony and generally have thicker, silty surface layers. Unit S76 is clayey, shallow, and extremely stony.

High elevations and northerly slopes have soils with moderately dark surface layers reflecting somewhat greater precipitation or more effective moisture available for growth of grasses. Reconnaissance Units 82, 83, and 84 occupy these areas. Unit 82 soils are formed in silty wind deposits on north slopes. Unit 83 soils are shallow, moderately fine to fine-textured, and very stony. Unit 84 soils are rocky and very shallow.

The narrow bottomlands along upper reaches of the streams have soils of Reconnaissance Units 1, 3, 10, 15, and 43. Unit 26, 31, and 42 soils occupy a few small basins in the uplands. Unit 1, 3, and 26 soils are well drained. Unit 1 soils are deep and silty. Unit 3 soils are loamy and underlain by gravel at less than 20 inches. Unit 26 soils are silty and underlain by semi-deep, silty or clayey soils with impeded drainage. Soils of Units 10 and 15 have thick, dark surface horizons. Unit 42 and 43 soils are salt-affected. Unit 31 soils are deep, clayey soils with strong granular structure. They often occur as clay dunes at the margins of basins.

Areas of older metamorphic, igneous, and shale bedrock occur in the north end of the basin. Locey and (Bs) soils occur on rolling to steep shale hills. The (Pe) soils occur over quartz diorite bedrock.

FORESTED UPLANDS (sub-humid)

The northwest part of the basin is forested. Soils of the Klicker series occupy the forested areas underlain by basalt and andesite. They are stony, moderately deep, slightly acid, fine loamy soils. Hall Ranch, Rock Creek, and Hankins soils also occur. Logan Valley and Crane Prairie are high badins with gravel terraces occupied by shallow (Bg) soils with cemented hardpans. Forested areas are used for summer range and timber production and are important for deer and elk habitat. Some hay is produced by flooding of meadow basins.

MINERALS

An exceptionally large and pure deposit of diatomite is located in the Otis-Juntura basin, which straddles the Malheur-Harney county line some 70 miles west of Vale. It is the site of a large open-pit mine operated by Eagle-Picher Minerals. The ore from this mine is processed at an Eagle-Picher mill about 7 miles wet of Vale and shipped to markets via

railroad. Another large occurrence in Harper basin has been extensively explored and mined intermittently since 1910; it is currently the target of a proposed diatomite mine. Another proposed diatomite mine site is about 45 miles west of Vale in the Rome area. This area has been extensively explored and mined intermittently since 1910. Gold-silver deposits are also found mainly in the eastern and northern part of the Malheur resource area.

The Middle Fork drainage from Highway 20 north has a high potential for diatomite, mercury cinnabar, and gold. The potential for gold is moderate in the Middle Fork drainage from Riverside up.

Recreational minerals include petrified wood and agates. Petrified wood is found in the southern uplands and the Middle Fork unit, while agates are found in the Middle Fork unit north of Highway 20 and west of Warm Springs Reservoir.

APPENDIX 3

GROUNDWATER

The three major water-bearing aquifers in the lower basin are the Quaternary Sands and Gravel Aquifer, Upland Gravel Aquifer, and the Glens Ferry Formation.

The unconsolidated Quaternary Sand and Gravel Aquifer is found in the main valleys. This aquifer is an extensive shallow alluvial aquifer consisting of 10 to 40 feet of unconsolidated sand and gravel. The aquifer is overlain by 10 to 50 feet of silt and is generally a very reliable source of water. The Upland Gravel Aquifer contains saturated parts of upland gravel above the valleys and benches that are overlain by fluvial and eolian silt deposits a few feet to 30 feet thick. This aquifer flows in the Quaternary Sands and Gravel Aquifer. The Glens Ferry Formation is composed of lacustrine siltstone with occasional sand and gravel layers. This formation occurs locally throughout the entire area and groundwater is generally located over 100 feet deep. (Gannett 1990)

The Quaternary Sands and Gravel Aquifer is most widely used for groundwater for domestic and irrigation purposes. The soils are predominately silt loams and sandy silt loams that are moderately permeable. The overlying silt is permeable and the saturated portion contributes water to the shallow aquifer. Deep percolation from irrigated farm fields and leakage from canals and laterals contribute the largest amounts of groundwater recharge to the shallow aquifer. The water table rises during the irrigation season in response to this introduced surface water. Groundwater flow in the shallow aquifer moves from the edges of the valley toward the river. Where the valley is narrow, the groundwater flows directly toward the rivers. The gradient flattens out in the Cairo/Ontario area widens out and groundwater velocity is decreased.

GEOTHERMAL

A shallow hot aquifer underlies Vale and appears to be at least 10 miles long. Hot springs are known from Vale west to Little Valley. This aquifer appears to be the discharge area for hot, deep-circulating regional groundwater ascending from depths along a major fault zone. The known hot aquifer discharges to the Malheur River primarily through hotsprings. Geothermal development has occurred near Vale in a 40-acre area. Current production has resulted in water level declines in part of the developed area. Temperature drops in parts of the area have accompanied these declines (Gannett 1988.)

APPENDIX 4

VEGETATION

HISTORICAL PLANT COMMUNTIES

Immediately prior to European settlement in the late 19th century, two major shrub-dominated vegetative types dominated the Cold Desert, lower elevation plant communities. The sagebrush and bunchgrass communities typified one type, while the other consisted of the salt desert shrub communities. (McArthur, Plummer, Davis 1978 USDA research report)

Several forms of sagebrush species grew in common with bluebunch wheatgrass (*Agropyron spicatum)* and Idaho fescue (*Festuca idahoensis*.) These were basin big sagebrush (*Artemsia tridentata tridentata*), mountain big sagebrush *(Artemsia tridentata vaseyana*), and Wyoming big sagebrush (*Artemsia tridentaya wyomingensis*.) Additional associated shrubs included rabbitbrush (*Chrysothamnus spp*.), bitterbrush (*Purshia tridentata*), and mountain mahogany (*Cercocarpus ledifolius*.)

The salt desert lands differed from sagebrush lands in that they occurred in zones of lesser precipitation, generally at lower elevations, and usually contained higher salt concentrations. These lands were usually dominated by chenopod shrubs such as Atriplex types, including saltbrush (*Atriplex canescens*), shadscale (*Atriplex confertifolia*), and greasewood (*Sarcobatus vermiculatus*.)

High-elevation vegetation communities included western juniper (*Juniperus occidentalis*) and quaking aspen (*Populus tremuloides*) in the tree overstory, with mountain snowberry (*Symphoricarpos oreophilus*), sagebrush, and willow (*Salex spp*.) constituting an understory shrub layer. Many north-facing slopes in the northern part of the Malheur Resource Area were dominated by ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudtsuga menziesii*.) Understory shrub species included sagebrush and bitterbrush.

PLANT COMMUNITIES IN BLM RESOURCE AREAS AND SUBBASINS

Vegetation type and acres by subbasin and percentages of plant communities in BLM's Malheur Resource Area (Vale District) and Three Rivers Resource Area (Burns District), are summarized below and in Table 4-1 on following page.

Big Sage/Perennial grassland	39%
Big Sage/Annual grassland	17%
Low & Stiff Sage/Grass	16%
Native Perennial Grass	6%
Juniper/Big & Low Sage	5%
Mtn Big Sage/Perennial Grass	4%
Annual grassland	3%
Big Sage/Crested Grass	4%
Rabbit Brush/Grass	2%
Forest/Pine-Fir/Mtn Shrub	2%
Rock	2%

VEGETATION TYPE	BU DIS	BULLY CREEK	TOTALS-ALL SUB-BASINS	PERCENT %%%%%
ANNUAL GRASS	5	1,377.60	64,444.00	3
CRESTED WHEAT	12		29,611.10	2
BIGSAGE/CRESTED WHEAT GRASS	14	2,461.10	32,344.00	2
BIG SAGE/PERRN GRASS	206	80,679.80	727,394.90	39
LOWSAGE/GRASS	103		172,570.80	9
STIFFSAGE/GRASS	41	47,598.60	124,240.90	7
SILV.SAGI GRASS			1,912.90	
MOUNT.BI G SAGE-PERRNAL GRASS	77		77,149.40	4
SALT DES ERT-SHRUB/GRASS	1		6,573.80	
MTNSHRUB/GRASS	2		13,170.10	1
JUNIPER/BIGSAGE	65	1.6	74,678.70	4
JUNIPER/LOWSAGE	15		25,456.20	1
FOREST/PINE-FIR	5		16,731.90	1
QUAKEN ASPEN			705.5	
NATVPERRNGRASS	11	2,350.90	118,858.40	.6
RABBIT BRUSH/ GRASS	6	8,385.80	35,390.10	2
BIG SAGE/ANNUAL GRASS	21	117,515.20	328,343.90	17
ROCK		25,013.10	37,379.20	2

VEGETATIVE COMMUNITIES BY WILDLIFE HABITAT

Vegetative communities can also be described in terms of wildlife habitats. Sagebrush steppe, riparian habitat and wetlands, juniper woodlands, and forest habitat are used to help describe the vegetative communities in the Malheur basin.

Sagebrush steppe includes many upland vegetation communities comprised of shrubs, grasses, and forbs. Typical understory communities include bluebunch wheatgrass, smooth brome (*Bromus inermis*), cheatgrass (*Bromus tectorium*), Idaho fescue, Nevada bluegrass (*Poa nevadensis*), junegrass (*Koeleria*), sandbergs bluegrass (*Poa sandbergii*), bulbous bluegrass (*Poa bulbosa*), arrowleaf balsamroot (*Balsamorhiza sagittata*), weedy milk vetch (*Astragalus miser*), tapertip hawksberd (*Crepis acuminata*), buckwheat (*Eriogonum spp.*), lomatium (*Lomatiun spp.*), phlox *(Phlox spp.*) and many others. These plants are important to most small and large species of wildlife because they supply both food and cover. Significantly more species of wildlife can find suitable breeding and feeding habitat in areas with a shrub overstory and an abundant grass and forb understory, than in those that are primarily shrub dominated.

Riparian areas consist of plant communities associated with streams and rivers. The structure, food, and water provided in riparian areas makes them the single most diverse and productive habitat for wildlife. Well-developed riparian areas include varying mixtures of trees, shrubs, grasses, forbs, sedges, and rushes. Common mixtures include aspen, willow hawthorn (*Crataegus spp.*), alder (*Alnus spp.*), bitter cherry (*Prunus emarginata*), black cottonwood (*Populus trichocarpa*), *mockorange (Philadelphus), wild rose (Rosa spp.), bluegrass (Poa spp.), clover (Trifolium spp.*), sedge (*Carex spp.*), dogwood (*cornus spp.*), and wiregrass (*Juncus balticus.*) Riparian vegetation and structure is exceptionally valuable as habitat for a wide array of wildlife species.

Other permanently wet or seasonally wet areas, typically called wetlands, include reservoirs, sloughs, playas, meadows, and springs. Wetlands can occur at various elevations and landscape settings. These sites often support combinations of willow, cattail (*Typha latifolia*), chokecherry and bittercherry, hawthorn, rushes, sedges, and various grass species including bluegrass and ryegrass (*Lolium spp.*)

Areas dominated by juniper are concentrated along the western third of the Malheur basin near Juntura, Beulah Reservoir, Stockade Mountain, and Ironside Mountain. Juniper stands vary greatly in their value as habitat depending upon factors such as height, stock density, and age of trees. For example, large trees provide cavities for nesting birds, while medium-sized trees provide nest sites on limbs for robins (*Turdus migratorius*), and small conifer nesting species such as kinglets (*Regulus spp.*) Deer and elk use juniper for warmth and escape cover. Juniper exhausts groundwater replenishment and its expansion into the shrub steppe decreases shrubs, grasses, and forbs that are important to big game, as well as many small mammals and birds.

Forest habitat includes species such as ponderosa pine, Douglas-fir, and western larch (*Larix occidentalis Nutt.*) Forest sites are often interlaced with stands of aspen and understory shrubs. Cavity-dependent species of forest-dwelling birds and mammals require snags for their reproduction. The size, age classes, and stocking levels of forest tree species influence their values as wildlife habitat for game and non-game species. Dead and down woody material provides structure for a variety of purposes and plays an important role in the overall ecology of the forest and its wildlife.

SPECIAL STATUS SPECIES

Within the past 10 years, management attention focused primarily on the 17 special status species found in BLM's Malheur Planning Area that were formerly designated by the US Fish and Wildlife Service (USFWS) as Category 1 and 2 species. They are now BLM Bureau Sensitive Species and are listed in Table 4-2.

LOCATIONS OF SPECIAL STATUS SPECIES

The known locations of several special status species include Vale sand hills, ash deposits, sagebrush steppe, and limestone.

Vale sand hills—Malheur forget-me-not (*Hackelia cronquistii*) and Mulford's milk-vetch (*Astragalus mulfordiae*) are found north, south, and west of Vale in a ring of sand/sandy loam. A habitat management plan is in place for the Malheur forget-me-not. They are both threatened by off-highway vehicle use, livestock grazing, and noxious weeds.

Ash deposits—One of the distinguishing features of the northwestern portion of the Owyhee uplands is the ash deposits that extend from Rome to Westfall. Several endemic species occur, one of which is the Harper Valley fiddleneck (*Amsinckia carinata.*)

Sagebrush steppe—Solitary milk-vetch (*Astragalus spp.*), north to Westfall, and Biddle's lupine (*Lupinus spp.*), north to Warm Springs Reservoir, are the most widespread of the species of concern.

Limestone—Snake River goldenweed (*Pyrrocoma radiatus = Haploppappus radiatus*) has its primary range in Idaho, however, it can also be found in the Huntington, OR area. The primary threat is invasion of exotic species due to habitat modification from livestock grazing and/or fire. Cheatgrass is its major competitor.

Table 4-2

BLM's Vegetative Bureau Sensitive Species

Common Name	Symbol	Scientific Name	Family
Malheur Valley fiddleneck		*Amsinkia carinata*	Borag
Mulford's milk-vetch	Asmu	*Astragualus mulfordiae*	Fabac
Weak stemmed milk-vetch	Asso3	*Astragalus solitarius*	Fabac
Sterile milk-vetch	Asst4	*Astragalus sterilis*	Fabac
Cusick's chaenactis		*Chaenactis cusickii*	Aster
Collomia		*Collomia renacta*	Polem
Golden buckwheat	Erch6	*Eriogonum chrysops*	Polyg
Malheur forget-me-not	Hacr4	*Hackelia cronquistii*	Borag
Snake River golden weed	Hara2	*Haplopappus radiatus*	Aster
Grimy ivesia		*Ivesia rhypara var. rhypara*	Rosac
Davis' peppergrass	Leda2	*Lapidium davisii*	Brass
Biddle's lupine	Lubi2	*Lupinus biddlei*	Fabac
Cusick's lupine	Lucu3	*Lupinus cusickii*	Fabac
Smooth blazing-star	Memo2	*Mentzelia mollis*	Loasa
Packards's blazing-star		*Mentzelia packardiae*	Loasa
Ertter's groundsel	Seer4	*Senecio ertterae*	Aster
Owyhee clover	Trow	*Trifolium owyheense*	Scrop

APPENDIX 5

FISH & WILDLIFE RESOURCES

FISH RESOURCES
(Malheur River Basin Fish Management Plan, ODFW 1990)

Prior to the construction of reservoirs on the Snake River, the basin supported large runs of Chinook salmon (*Oncorhynchus tshawytscha*), and steelhead trout (*Oncorhynchus mykiss*.) Historically, these fish spawned in the upper basin but subsequent dam construction blocked their migration. However, several other indigenous and introduced species are currently present. Game fishes found in the basin include the following species: rainbow trout (*Oncorhynchus mykiss*) and redband trout (*Oncorhynchus mykiss*); chars, brook trout (*Salvelinus fontinalis*), and bull trout (*Salvelinus confluentus*); mountain whitefish (*Coregonus williamsoni*); largemouth bass *(Micropterus salmoides*) and smallmouth bass (*Micropterus dolomieu*); bluegill (*Lepomis pallidus*); yellow perch (*Perca flavescens*); brown bullhead (*Ameiurus spp.*); and channel catfish (*Ictalurus spp.*) The basin is the only area in the state where trout fishing is allowed year-round.

Two significant fish species inhabit headwater streams in the basin. Each has unique habitat requirements. Redband trout are the most common native salmonid in the basin. They live in desert streams and can tolerate a harsh, arid environment. Compared with other species of trout, they can withstand high temperature, alkalinity, and low oxygen levels. Bull trout may also be found in forested headwater streams that have low water temperature, high stream gradient, and abundant instream woody material.

Special Status Species

The bull trout has been listed as a federal threatened species. It is presently on Oregon's Sensitive Species List. Bull trout require very cold, pristine streams (Buchanan, et al. 1997, Oregon Department of Fish and Wildlife, Status of Oregon's Bull Trout.) According to Oregon Department of Fish and Wildlife (ODFW), they have been eliminated from the main stem of the Malheur (ODFW, personal communication.) Many remaining populations are isolated in headwater areas. They do occur in the North and Middle Forks of the Malheur River. Bull trout occupy the North Fork from the headwaters (Swamp, Sheep, Elk and Little Crane Creeks) to and including Beulah Reservoir in Malheur, Harney, Grant, and Baker Counties. Spawning occurs in the fall in the headwaters, and some fish apparently pass through the North Fork to use Beulah reservoir as winter and spring habitat. The Middle Fork has bull trout populations utilizing spawning and rearing habitat in the upper headwaters (Snowshoe, Lake and Big Creeks.) Migrating bull trout can be found downstream below Summit Creek in Grant County.

In the Prairie City Ranger District, bull trout occupy 60 miles of stream habitat in the Middle Fork and 52 miles in the North Fork (see map following page 5-1.) Overall, bull

trout numbers and distribution have declined due to the loss of habitat resulting from timber harvest, wildfires, road building, dams, irrigation water diversions, mining, improper grazing, and reduction of water quality (Buchanan et al. 1997 ODFW, Status of Oregon's Bull Trout.) Loss of large wood recruitment in riparian zones has been a major contributor to the reduction of essential habitat needs.

Redband trout may be proposed for listing as a federal threatened species. If they are listed, the redband trout in the Malheur basin may be considered as a separate species because they have had access to the Snake River system.

WILDLIFE RESOURCES

For a listing of commonly occurring wildlife species in the basin, refer to Table 5-1 for bird species, Table 5-2 for mammal species, Table 5-3 for amphibian species, and Table 5-4 for reptile species.

Big Game
(ODFW Personal communication, 1998)

Within the Malheur River basin, the major big game species are Rocky Mountain elk (*Cervus canadensis*), mule deer (*Odocoileus hemionus*), pronghorn antelope (*Antilocapra americana*), and bighorn sheep (*Ovis canadensis*.) Black bear (*Ursus americanus*) and mountain lion (*Felis concolor*) are also found in the basin but are not as abundant as the other big game species.

Mule deer are the most widespread and abundant within the basin. However, their numbers are much lower than they were in the 1960's, primarily due to the reduction of crucial winter range habitat and several severe winters coupled with several years of drought in the late 1980's and early 1990's. Mule deer are quite adaptable and occupy a wide variety of habitats. While some are year-long residents within an area, most tend to summer at higher elevations dominated by conifers and winter at lower elevations on shrub dominated habitats and agriculture lands within the basin.

Historically, elk were found in the timbered portions of the Middle Fork, North Fork, and Willow Creek Resource Units. Approximately 15 to 20 years ago, elk started to colonize some of the more open shrub/bunchgrass habitats in the Willow Creek, Bully Creek, Main Malheur and South Fork, and Lower Willow Creek subbasins. With this movement came increasing amounts of elk damage to agricultural crops, a problem that persists today. Because of damage, the Bully Creek, Main Malheur and South Fork subbasins fall within an elk de-emphasis zone where management is intended to keep elk numbers at a level tolerable to landowners. However, due to differing points of view on elk management among private landowners, efforts to substantially reduce existing populations have been unsuccessful to date.

Pronghorn antelope occupy the shrub-dominated habitats on more gentle terrain, primarily in the southern and eastern units of the basin. Pronghorn numbers have varied substantially over the last 60 years in relation to winter severity and fawn survival. The current population is slightly below what was considered to be an all-time high about 1991. Since most of their diet during winter consists of sagebrush, any sagebrush management proposals must be carefully designed if the quality of pronghorn habitat is to be considered.

Historically, bighorn sheep were common in the main Malheur River Canyon and the lower reaches of many of its tributaries. However, they disappeared in the early 1900s due to unregulated hunting, disease, and competition with domestic livestock for forage. Currently one population exists in the South Fork of the Malheur River in the vicinity of Riverside. This population, estimated at 100 head, is the result of a reintroduction of a native species into historic habitat in 1987 and 1988. There still is considerable suitable historic habitat found within the basin that would support bighorn sheep populations, but as long as there are domestic sheep operation in the vicinity, no further re-introductions are planned at this time.

Upland Gamebirds

Important upland gamebird species currently found within the basin are sage grouse (*Centrocercus urophasianus*), chukar partridge (*Alectoris chukar*), ring-necked pheasant (*Phasianus colchicus*), valley (California) quail (*Callipepla californica*), hungarian (Gray) partridge (*Perdix perdix*), ruffed grouse *(Bonasa umbellus*), and blue grouse (*Dendragapus obscurus*.)

Historically, mountain quail (*Oreortyx pictus*) were present in the riparian areas within the basin, but they haven't been observed in recent years. It is hypothesized that gradual degradation of riparian habitat condition was the primary factor involved with their disappearance. Sharp-tailed grouse (*Typanuchus phasianellus*) were also found in the sagebrush and bunchgrass habitats of the basin but were locally exterminated in the early 1900's. The exact cause for their disappearance is unknown but it is speculated that habitat loss was the primary cause.

Although their numbers have declined substantially over the last 40 to 50 years, viable populations of sage grouse are distributed throughout the sagebrush habitats of the basin. Continuing juniper encroachment into sagebrush, bitterbrush, and mountain mahogany communities is effectively reducing the quality of habitat.

Ring-necked pheasant and valley quail are primarily located in and around the intensive agricultural areas in the eastern portion of the basin, however, they can also be found along riparian waterways. Abundance of both species has declined substantially in the last 35 years mainly due to changes in agricultural practices. Clean farming practices associated with intensive agriculture have decreased the quantity and quality of winter cover for these species (ODFW personal communication, 1998.)

Chukar partridge were introduced into the shrub steppe areas of the basin in the 1950's and 1960's. Population numbers have varied highly over the years and are tied closely to winter severity and reproductive success. The most abundant populations of chukar are found in the Malheur River Canyon and the lower ends of many of its tributaries. Within the basin, they can be found in greatest number in rimrock areas, which are primarily located on public lands.

Furbearers

Primary furbearers in the basin include bobcat (*Felis rufus*), raccoon (*Procyon lotor*), beaver (*Castor canadensis*), muskrat (*Ondatra zibetbicus*), river otter (*Lutra canadensis*), and mink (*Mustela vison.*) Aside from the bobcat, these species are closely associated with riparian zones and wetlands throughout the basin. Normally, there is limited conflict between these species and agricultural interests. However, beaver occasionally cause problems during the irrigation season by damming canals and plugging culverts.

Black bear are found in the forested headwater areas of the Malheur, and cougar are present in the major river corridors and will range throughout the basin.

Non-game Wildlife

A wide variety of non-game wildlife species occur within the basin and use a variety of habitats on either a seasonal or yearlong basis. Populations of most species are considered to be doing well.

Wild Horses

Wild horses are found in both Harney and Malheur County portions of the Malheur basin. They are managed by the BLM. Wild horses often compete with deer and elk for forage and water and can be considered "serious competitors for water in the desert areas."

The BLM Malheur Planning Area has no burros. Since 1971, horses have been removed from eight Herd Management Areas within the Malheur Resource Area due to limited horse numbers, resource damage, restrictive fencing, lack of publicly-owned water, and private land ownership.

Between 1920 and 1940, the US Army provided several remount stallions to Malheur County ranchers to provide the Army with an adequate supply of horses suitable for military purposes. These stallions were bred to local mares and their offspring brought higher prices than "cold-blooded" horses. Today, a few horses in Malheur County may possess the Army remount bloodlines, though they are several generations removed from the original stallions.

Animal Damage Control

Animal Damage Control (ADC) is an activity of the US Department of Agriculture Animal and Plant Health Inspection Service (USDA-APHIS.) It is initiated primarily in response to requests for help from livestock producers. The goal is damage management, not predator population management. The bulk of Oregon's program is carried out in Malheur County, where coyote populations have been consistently high relative to the rest of Oregon; 3-6% of the Malheur County coyote population is removed annually.

Special Status Species

Special Status Species Management may be directed by law under US Fish and Wildlife Service recovery plans. In the case of formally listed species, management is under the Endangered Species Act or by policy and interagency cooperation under conservation agreements. Both kinds of management arrangements are likely to influence land use within the analysis area into the foreseeable future.

The bald eagle *(Haliaeetus leucocephalus)* which winters along the Malheur River corridor is a threatened species at both the state and federal level. The American peregrine falcon (*Falco peregrinus*) is classed as endangered by both the state and federal government; it could be occasionally found along the Malheur River corridor, but whether or not it will breed there is unknown. The northern kit fox (*Vulpes macrotis*) is threatened at the state level and the spotted frog (*Rana pretiosa*) is a candidate for federal listing. Several other species are on the Oregon Sensitive Species list and warrant special attention either because they are few in number or their habitat is threatened. These include northern goshawk (*Accipiter gentilis*), flammulated owl (*Otus flammeolus*), white-headed woodpecker (*Picoides tridactylus*), black-backed woodpecker (*Picoides arcticus*), pileated woodpecker (*Dryocopus pileatus*), Williamson's sapsucker (*Sphyrapicus thyroideus*), pygmy nuthatch (*Sitta pygmaea*), northern pygmy owl (*Glaucidium gnoma*), black rosy finch (*Leukcosticte arctoa arctoa*), loggerhead shrike (*Lanius ludovicianus*), ferruginous hawk (B*uteo regalis*), burrowing owl (*Speotyto cunicularia*), Swainson's hawk (*Bueto swainsoni*), bobolink (*Dolichonyx oryzivorus*), greater sandhill crane (*Grus* canadensis tabida), bank swallow (*Riparia riparia*), black-throated sparrow (*Amphispiza bilineata*), pygmy rabbit (*Brachylagus idahoensis*), western ground snake (*Sonora semiannulata*), northern leopard frog (*Rana pipiens*), Mojave black-collared lizard (*Crotaphytus bicinctores*), and desert horned lizard (*Phrynosoma platyrhinos*.)

Table 5-1

Bird Species Found In The Malheur Basin
(source: Bureau of Land Management, Vale OR: March 1996)

Common names	***Scientific names***
American kestral	*Falco sparverius*
American goldfinch	*Carduelis tristis*
American white pelican	*Pelecanus erthrorhynchos*
American crow	*Corws brachyrhynchos*
American coot	*Fulica americana*
American robin	*Turdus migratorius*
American widgeon	*Anas ameicana*
Bald eagle	*Haliaeetus leucocephalus*
Bank swallow	*Riparia riparia*
Barn swallow	*Hirundo rustica*
Belted kingfisher	*Ceryle alcoyon*
Black-crowned night heron	*Nrctlcorax nycticorax*
Black billed magpie	*Pica pica*
Black-backed woodpecker	*Picoides arcticus*
Blue-winged teal	*Anas discors*
Brewer's sparrow	*Spizella breueri*
Brewer's blackbird	*Euphagus cyanocephalus*
Burrowing owl	*Athene cunicularia*
California gull	*Larus califonicus*
California quail	*Callipepla californica*
Caspian tern	*Sterna caspia*
Chipping sparrow	*Spizzella passerina*
Chukar partridge	*Alectoris chukar*
Cinnamon teal	*Anas cyanwtera*
Clark's grebe	*Aechmophorus clarkli*
Cliff swallow	*Hirundo prrrhonota*
Common nighthawk	*Chordeiles minor*
Common raven	*Corvus corax*
Common snipe	*Galliago gallinago*
	Accipiter cowri
Downy woodpecker	*Picoides pubescens*
European starling	*Sturnus vulgaris*
Ferruginous hawk	*Buteo regalis*
Gadwall	*Anas streperus*
Golden eagle	*Aquila chrrsaetos*
Gray flycatcher	*Empidonax urightii*
Great blue heron	*Ardea herooias*
Great horned owl	*Bubo virginianus*
Green-tailed towhee	*Pipilo choirurus*

Green-winged teal	*Anas crecca*
Hairy woodpecker	*Picoides villosus*
House sparrow	*Passer domesticus*
House finch	*Carpodacus mexicanus*
House wren	*Troglodytes aedon*
Killdeer	*Charadrius vociferous*
Lark sparrow	*Chondestes grammacus*
Lazuli bunting	*Passerina amoena*
Least sandpiper	*Calidris minutilla*
Lewis' woodpecker	*Melanerper leuis*
Loggerhead shrike	*Lanius ludvicianus*
Long billed curlew	*Numenius americanus*
Long-eared owl	*Asio otus*
Mallard	*Anas platrrhrnchos*
Mountain bluebird	*Sialia currucoides*
Mountain chickadee	*Parus gambeli*
Mourning dove	*Zenaida macroura*
Northern harrier	*Circus cyaneus*
Northern goshawk	*Accipiter gentilis*
Red shafted flicker	*Colaptes cafer*
Norther bald eagle	*Haliaeetis leucocephalus*
Norther oriole	*Icterus galbula*
Northern pintail	*Anas acuta*
Osprey	*Pandion haliaetus*
Pairie falcon	*Falco mexicanus*
Red -winged blackbird	*Aeglaius phoeniceus*
Red-tailed hawk	*Buteo jamaicensis*
Redhead	*Aythra americana*
Ring-necked duck	*Aythra colaris*
Ring-billed gull	*Larus delawarensis*
Ring-necked pheasant	*Phasianus colchicus*
Rock wren	*Salpinctes obsoletus*
Rock dove	*Columba livia*
Rough-legged hawk	*Buteo lagopus*
Rufous-sided towhee	*Pipilo erthrophthalmus*
Sage sparrow	*Amphispiza belli*
Sage thrasher	*Oroscoptes montanus*
continued on next page	

Table 5-1 Continued

Common Names	***Scientific Names***
Savannah sparrow	*Passerculus sanduichensis*
Say's phoebe	*Sayornis saya*
Scrub jay	*Aphelocoma coerulescens*
Sharp-shinned hawk	*Accipiter strainus*
Short-eared owl	*Asio flammeus*
Song sparrow	*Melospiza melodia*
Spotted sandpiper	*Actitus macularis*
Swainson's hawk	*Buteo suainson*
Townsend's solitare	*Myadestes tounsend*
Tree swallow	*Tachrcineta bicolor*
Turkey vulture	*Cathartes aura*
Vesper sparrow	*Pooecetes gramineus*
Violet-green swallow	*Tachrclneta thalassina*
Warbling vireo	*Vireo gilvus*
Western sandpiper	*Calidris maurii*
Western screech owl	*Otus kennicotii*
Wester Canada goose	*Sranta canadensis*
Western bluebird	*Sialia mexicana*
Western flycatcher	*Empidonax difficilis*
Western grebe	*Aechmophorus occidentalis*
Western kingbird	*Tyrannus verticalis*
Western wood-peewee	*Contopus sordidulus*
Western meadowlark	*Sturnella neglecta*
Western sage grouse	*Centrocercus urophasianus*
Willow flycatcher	*Empidonas trailii*
Wilson's phalarope	*Phalarwus tricolor*
Yellow-headed blackbird	*Xanthocephalus*
	Xanthocephalus
Yellow warbler	*Dendroica petechia*
Yellow-breasted chat	*Icteria virens*
Yellow-rumped warbler	*Dendroica coronata*
Eastern kingbird	*Tyrannus tyrannus*

Table 5-2

Mammal Species Found In The Malheur Basin

Common names	*Scientific names*
Badger	*Taxidea taxus*
Beaver	*Castor canadensis*
Big brown bat	*Eptesicus fuscus*
Black bear	*Ursus americanus*
Black-tailed jackrabbit	*Lepus californicus*
Bobcat	*Lynx rufus*
California myotis	*Myotis californicus*
Cougar	*Felis concolor*
Coyote	*Canis latrans*
Deer mouse	*Peromyscus maniculatus*
Desert woodrat	*Neotoma lepida*
Fringed myotis	*Myotis thysanodes*
Golden mantled ground squirrel	*Spermophilus lateralis*
Great basin pocket mouse	*Perognathus parvus*
Hoary bat	*Lasiurus cinereus*
Least chipmunk	*Eutamias minimus*
Little brown myotis	*Myotis lucifugus*
Long-tailed weasel	*Mustela frenata*
Long-eared myotis	*Myotis evotis*
Long-legged myotis	*Myotis volans*
Long-tailed vole	*Microtus longicaudus*
Merriam shrew	*Sorex merriami*
Mink	*Mustela vison*
Montane vole	*Microtus montanus*
Mountain cottontail	*Sylvilagus nuttalli*
Mule deer	*Odocoileus hemionus*
Muskrat	*Ondatra zibethicus*
Northern pocket gopher	*Thomomys talpoides*
Northern grasshopper mouse	*Onychomys leucogaster*
Norway rat	*Rattus norvegicus*
Ord kangaroo rat	*Dipodomys ordi*
Pacific western big-eared bat	*Plecotus townsendii*
Pallid bat	*Antrozous pallidus*
Porcupine	*Erethizon dorsatum*
Preble's shrew	*Sorex preblei*
Pronghorn antelope	*Antilocapra americana*
Pygmy rabbit	*Sylvilagus idahoensis*
Raccoon	*Procyon lotor*
Red fox	*Vulpes fulva*
Sagebrush vole	*Lagurus curtatus*
Short-tailed weasel	*Mustela erminea*
Silver-haired bat	*Lasionycteris noctivagans*
Small-footed myotis	*Myotis leibii*
Spotted skunk	*Spilogale putorius*
Spotted bat	*Euderma maculatum*
Striped skunk	*Mephitis mephitis*
Townsend ground squirrel	*Spermophilus townsendi*
Wandering shrew	*Sorex vagrans*
Wapiti	*Cervus canadensis*
Western pipistrelle	*Pipistrellus hesperus*
Western harvest mouse	*Reithrodontomys megalotis*
Western jumping mouse	*Zapus princeps*
White-tailed jackrabbit	*Lepus townsendii*
Yellow-bellied marmot	*Marmota flaviventris*
Yuma myotis	*Myotis yumanensis*

Table 5-3

Amphibian Species Found In the Malheur Basin

Common Name	Scientific Name
Bullfrog	*Rana catesbeiana*
Great Basin spadefoot toad	*Scaphiopus intermontanus*
Northern leopard frog	*Rana pipiens*
Northern long-toed salamander	*Ambystoma macrodactylum*
Pacific treefrog	*Pseudacris regilla*
Spotted frog	*Rana pretiosa*
Western toad	*Bufo boreas*
Woodhouse's toad	*Bufo woodhousei*

Source: BLM, Vale OR; March 1996

Table 5-4

Reptile Species Found In The Malheur Basin

Common Name	Scientific Name
Common garter snake	*Thamnophis sirtalis*
Desert collared lizard	*Crotaphytus bicinctores*
Desert horned lizard	*Phrynosoma platyrhinos*
Gopher snake	*Pituophis melanoleucus*
Great basin rattlesnake	*Crotalus viridis*
Long-nosed leopard lizard	*Gambelia wislizenii*
Rubber boa	*Charina bottae*
Sagebrush lizard	*Sceloporus graciosus*
Side-blotched lizard	*Uta stansburiana*
Striped whipsnake	*Masticophis taeniatus*
Wandering garter snake	*Thamnophis elegans*
Western skink	*Eumeces skiltonianus*
Western whiptail	*Cnemidophorus tigris*
Western fence lizard	*Sceloporus occidentalis*
Yellow-bellied racer	*Coluber constrictor*

Source: BLM, Vale OR; March 1996

APPENDIX 6

CULTURAL RESOURCES

HISTORICAL

Fur trappers became the first non-Indian presence in southeast Oregon early in the 19th century. Migration of immigrants over the Oregon Trail to the Willamette Valley, discovery of gold in Jordan Creek in 1883, and the opening of mines at Silver City in the Owyhee Mountains brought non-native people into the region.

Between four and nine thousand years ago, the northern Great Basin was a series of very large lakes and marshland. It is believed the predecessors of the Burns-Paiutes lived in caves near their shores. They hunted; trapped fish, birds, and small game; and wove items out of tules, willow, Indian hemp, and sagebrush bark. Shifts in climatic changes caused lakes and marshes to alternately dry up and then fill up. When the lakes began to dry up, and the people became seasonal migrants, traveling in small family groups in search of food and water (Archaeology of Oregon, C. Melvin Aikens, 1993.)

The Paiute people believe that the Paiutes have lived in this area since before the Cascade Mountains were formed. Recent researchers, on the other hand, believe that about 1000 years ago, an influx of Paiute-speaking people came from the south and migrated throughout the Great Basin.

The Burns-Paiute Tribe descended from the Wadatika band, named after the wada seeds they collected near the shores of Malheur Lake for food. Their territory included Oregon east of the Cascades (except the Wallowas) and parts of southwestern Idaho.

The first Europeans with whom the Wadatika had contact were trappers who explored the area looking for beaver in the 1820's, 30's, and 40's. Many Wadatika were killed by smallpox, cholera, and other diseases brought by Europeans. As more settlers arrived, resources depended upon by the Paiute people were depleted or destroyed. Raiding wagon trains and camps increased as more outsiders came through the Wadatika's territory and destroyed their livelihood. By the 1840's, the Northern Paiute bands had acquired horses and guns, and such raids became an important way for the Wadatika people to defend themselves and survive. The US Army began to control the Paiutes in the 1860's.

In 1873, the Malheur Reservation was signed into law; its 1,778,560 acres included Castle Rock, Strawberry Mountain, the North and South Forks of the Malheur River, and portions of Harney County. This area was reserved for all bands of Indians still "wandering" in Eastern Oregon. Over the next years, settlers continued to invade reservation land, and the Bannock Indian War started. In 1879, Indians were rounded up and moved off the reservation. The reservation was disbanded in 1883 and opened for settlers under the Homestead Act.

The current Burns-Paiute reservation of 771 acres near Burns was acquired in the 1920's and 1930's but was not declared a reservation until 1972.

CURRENT

Native Americans

Although the Burns-Paiute no longer own land in the Malheur basin, they still consider Castle Rock to be a sacred site. Traditional use areas on BLM lands around Stinking Water Mountains (primarily Biscuitroot Cultural Area of Critical Environmental Concern) are still used. Natives come from Burns, Warm Springs, and Owyhee, Oregon; Yakima, Washington; Fort Hall, Idaho; Fort Bidwell, California; and Fort McDermitt, Nevada, to gather traditional foods.

Land Ownership

Approximately 47% of the land in the Malheur basin is administered by BLM, 12% by the US Forest Service (USFS), 4% by the state, and 37% by private landowners or municipalities. BLM lands consist primarily of rangelands, USFS lands are in the forested headwaters, and Reclamation manages lands around Bully Creek Reservoir. Most of the valley bottoms and some rangelands are privately owned.

Population

Approximately 20,000 people live in the Malheur basin. The largest towns are Ontario (population 10,000), Vale (population 1,800), Harper, and Juntura. Other important social/cultural centers include Drewsey, Little Valley, Westfall, Willow Creek, Jamieson, Brogan, and Ironside.

Economy

Personal income is substantially lower than the state average. Employment in the service sector has been increasing significantly in recent years, while the number of jobs in the farm sector has been decreasing. Agricultural activity in Malheur County is based on livestock and crop production and food processing. In Harney County, the livestock industry is a major factor in the economy of the county. Livestock feed production on both home property and public range areas dominate the land use pattern.

Because it is difficult to find data on the Malheur River Basin, many of the data in this section pertain to all of Malheur County. It generally will be applicable to the study area. Malheur County is relatively large for the few people who inhabit it.

Economic and population growth in nearby areas in Idaho (especially in Canyon, Ada, and Payette counties) is contributing to a gradual increase in the Malheur County population. This growth has increased demand for housing in the Ontario, Nyssa, and Vale areas. It has also increased the diversity of businesses. The economic outlook for the region is for moderate to strong growth as it takes advantage of its proximity to the growing Boise economy.

Income

Personal income is one of the best indicators of the wealth of an area because all sources of income are included. Wages and salaries are a major component of personal income in most areas. However, dividends, interest, social security payments, Aid to Families with Dependent Children, employment compensation, disability payments, and other government payments are another major source of income for retirees and lower income people.

Personal income in 1993

	Malheur County	Oregon
Per capita personal income	$15,628	$19,437
Components of total personal income		
Earnings	59.7%	65.9%
Dividends, interest	16.9%	16.7%
Government payments	23.3%	17.4%

Employment

The leading employment sectors in 1993 were services, retail sales, farms, and government (11,022 jobs.) Total employment was 16,304. From 1990 to 1993, employment in the agriculture services, forestry, and fishing sector increased 104.4%; services sector increased 35.8%; and farm employment decreased by 18.4%.

A 1993 economic study by Frederick Obermiller of Oregon State University (OSU) found that agriculture and related industries were the largest sector of the Malheur County economy. When measured by the percentage of total sales, food crop procurement and processing (25% of total sales) was by far the largest industry, followed by crop production (11%), livestock production, procurement, and feeding (9%), and wholesale and retail trade (9%.)

LAND USE

Agriculture is the predominant land use. Rangelands throughout the basin provide livestock forage during the summer. River valleys in the higher portions of drainages produce hay and forage crops for livestock. River valleys from Harper eastward are used extensively to grow alfalfa, clover, sugar beets, onions, potatoes, corn, small grains, and truck and seed crops. Forested land in the northwestern corner makes up about 10% of the basin and is used for timber harvest, recreation, and grazing.

Row Crops

Malheur County ranks first in the State of Oregon in production and acreage of onions and sugar beets and third in potato production. These three crops contributed $72 million to the county agricultural income in 1996, with potatoes and onions leading the way $30 million each. These three crops have a very large impact on the county's economy in terms of jobs created by processing and handling, in addition to the field production.

Onions are the most important cash crop. All are produced for the open market, which can be quite volatile. The county's overall economy can be affected strongly by the fluctuating onion market. Over 90% of the potatoes in the county are produced for processing under contract with two primary processors. Contracts continually are becoming more stringent based on quality. Potato producers have converted some of their acreage to sprinkler irrigation to make it easier to achieve quality standards compared to the traditional furrow irrigation technique. Sugar beets are a traditional row crop that have been produced for many years. All are grown under contract with the Amalgamated Sugar Company, a grower-owned association, located in Nyssa, Oregon.

Field Crops

Wheat is the major cereal crop. Soft white wheat is famous in world markets for quality pasta and pastries. Wheat is also produced primarily as a rotation crop with row crops to maintain clean, disease-free soil. Over 90% of the wheat is raised on irrigated soil. In 1996, 45,000 acres were utilized for wheat production at an estimated sales of over $20 million. Barley and field corn are raised for grain that mostly is consumed locally by feedlots and dairies.

Malheur County produces more alfalfa hay than any other county in Oregon at over 50,000 acres per year. Most of the alfalfa hay produced in the county is either fed by the producer or sold for local consumption. In addition, eastern Oregon is one of the major seed producers of alfalfa and clover seed (7,300 acres per year.)

Livestock pasture production involves around 40,000 irrigated acres. The majority of pasture is produced on ground that is not well-suited for intensive farming.

Other crops grown in the county include dry field beans, sweet corn, peppermint, spearmint, and mushrooms. Dry beans are a relatively easy crop to grow and can fit into rotations in many instances. Sweet corn is generally grown under contract, with the processor determining planting dates and providing the equipment and manpower for harvesting and transporting to the plants. Mint oil is distilled locally and marketed out of the area. A large mushroom operation in Vale contributes significantly to the agricultural economy by providing employment and also utilizing straw in part of its production process.

Livestock, Livestock Grazing

The Malheur County dairy industry ranks fifth in the state in regards to milk sales and averages around $10 million annually. Most of the dairies are located within the Owyhee and Malheur drainage systems.

Malheur County has more beef cows (70,000) than any county in Oregon. Commercial herds average about 500 cows. Gross income from cattle was $47 million in 1996. Many of these operators run on BLM rangeland, as well as, deeded property. Rangeland contributes heavily toward cattle operations and is a significant segment of many ranch operations.

Grazing permits are linked to privately owned property and enhance the productive capacity of private property by providing additional forage during certain seasons. This allows rest or production of hay or other forage on private property. A common practice is to produce alfalfa or other hay on irrigated pastures during the summer when cattle are on public rangeland.

1994	Malheur County	Oregon
Inventory (head)		
Cattle/calves	170,000	1,205,000
Sheep/lambs	13,500	420,000
Sales		
Cattle/calves	$50,329,000	$375,200,000
Sheep/lambs	$474,000	$18,500,000

In Malheur County, 18% of forage is BLM and 3% is USFS. In Harney County, 16.8% of forage is BLM.

The total agriculture income in 1996 for Malheur County was $186,933,000 (Malheur County Agriculture, OSU Extension Service, 1996-97)

IRRIGATION

Control and management of the irrigation water resource rests with a number of irrigation districts each with a governing body and some sharing management with other districts. Inter-district coordination assures the most effective use of the water resource.

Development of control and distribution systems has been done both by private companies and the Bureau of Reclamation projects. The Vale area is served by both Reclamation and private companies, including the Warmsprings and Vale-Oregon Irrigation Districts. Water for that area and part of the area between Vale and Ontario comes from the Malheur River with its three reservoirs, Beulah, Warm Springs, and Bully Creek, which store water for later release into the system.

The Jamieson-Brogan area is served by the Orchard Ditch Company, with the Malheur Reservoir and Willow Creek as supply sources. The Malheur Siphon, which crosses the valley just west of Cairo Junction, carries Owyhee River water over the Malheur River for irrigation in the Hyline, Dead Ox Flat, and adjacent areas. Hyline Farms and Skyline Farms, located north and west of Ontario, are private developments utilizing water pumped from the Malheur and Snake Rivers.

Water is distributed by the irrigation district from the point of diversion (storage, river diversion) through the main canal to a system of smaller canals and laterals to a diversion point at or near the individual farm, at which point it is put into the farm's distribution system. Water is adjudicated to specific areas of land and is allocated in a specific amount to those areas. There are provisions for delivering water in excess of the allocation subject to availability of water and additional cost.

Surface irrigation is the principal method application. Surface irrigation methods range from uncontrolled flooding on pasture lands to controlling the water through corrugates or furrows. To improve the efficiency of surface irrigation and better control the application of irrigation water, farmers have invested heavily in land leveling, cement ditches, and gated pipe. Thousands of acres have been leveled to establish uniform grades for best water control. Literally hundreds of miles of concrete ditches and gated pipe have been installed, which reduce seepage, improve water transportation efficiency, enable farmers to more effectively control weeds, and reduce irrigation labor. Portable checks control water level in the ditches, and farmers use siphon tubes to bring the water over the ditch bank and direct it into the field furrow.

URBAN/INDUSTRIAL WATER USE

General

Storm water is not treated by municipalities. All water that drains into storm sewers currently flows untreated into the Snake River. This water can carry motor oil, bacteria, lawn chemicals, heavy metals, and etc.

Three facilities have permits for point-source discharges in the Malheur basin. The first, Northwest Essential Oils Inc. distills onion oil at their plant on Island Road south of Ontario. They use treated city water as a coolant and then discharge it into the city sewer system. The second, City of Ontario discharges treated wastewater into the Snake River during the winter months. During the growing season, this treated wastewater is utilized to irrigate local agricultural fields for beneficial use. The third, Ore-Ida also discharges their effluent into the Snake River.

Water Treatment

The City of Ontario uses approximately 13 million gallons per day (MGD.) Nine MGD are pumped from the Snake River; the rest is pumped from eight groundwater wells. The city has water rights for 19.7 MGD. Water is distributed through 62.25 miles of mains. Major customers include ORE-IDA foods, Inc. and the Snake River Correctional Institution. On the average, the city treats 4.0 MGD in the winter and 7.5 MGD in the summer. Peak summer demand approaches 9.7 MGD, which includes approximately 3.76 MGD for lawn irrigation and 1.6 MGD for residential/business uses.

Wastewater Treatment

Water is treated via rapid mix, flocculation, clarification, and then rapid sand filtration. Chlorine disinfects the water. Water pumped from the Snake River requires iron and manganese reduction and the removal of turbidity, taste, odor, and bacteria. Well water requires only the reduction of iron and manganese and removal of bacteria.

The city tests the water regularly for pH, turbidity, residual chlorine, bacteria, trihalomethane, nitrate, inorganic chemicals, synthetic organic chemicals, volatile organic chemicals, lead, and copper. Finished water has a daily average of 0.07 nephelometer turbidity unit (NTU), and 7.6 to 8.2 pH.

The city treats 832 million gallons per year, of which 775 million gallons result from city use and the remainder comes from the Snake River Correctional Institution. The sewage averages 122 mg/L Biological Oxygen Demand (BOD) and 153 mg/L Total Suspended Solids (TSS) monthly.

Treatment includes screening, aeration, settling, disinfection with chlorine, and dechlorination with sulfur dioxide. BOD and TSS reduction and bacteria removal are required. Treated effluent is tested regularly for BOD, TSS, pH, temperature, residual chlorine, fecal coliform bacteria, *E. coli* bacteria, ammonia nitrate, nitrate nitrogen, and phosphate. The treated effluent averages 16 mg/L BOD and 36 mg/L TSS monthly.

RECREATION

Hunting

Big game hunting is the most common wildlife-related consumptive recreational activity that occurs within the basin followed by upland game bird hunting and fur trapping. In terms of non-consumptive use wildlife viewing, whether hunted or not, is becoming increasingly important to the public.

Deer hunting has varied with the deer population, but is currently at low levels in the basin compared to the 1950's and 1960's. Prior to 1991, when deer numbers were much higher than today, general buck seasons were held with no limit on the number of hunters. In 1991, controlled buck hunting was implemented primarily because of low deer numbers and correspondingly low success. This action substantially reduced deer hunting opportunity from historic levels. The amount of deer hunting recreation provided in the future will be closely tied to future population levels.

Elk hunting is also popular, with most hunting in the forested portions of the watersheds. As with all other big game hunting in this portion of the state, elk hunter numbers are limited within a wildlife management unit. Generally, the amount of elk hunting has increased most significantly in the last 15 years in the central and eastern portions of the basin as elk numbers have increased. Since most of the central and eastern portions of the basin are currently in an elk-de-emphasis zone, recreational hunting opportunity could decline if population numbers decline.

Compared to deer and elk, there is much less hunting opportunity for pronghorn antelope and bighorn sheep because their populations are much smaller. All hunting of these species has been controlled. Bighorn sheep have only been hunted for the last three years with one tag authorized each year in the Riverside area.

Sage grouse hunting historically involved general seasons and liberal bag limits. However, seasons and bag limits became restricted as populations declined. Currently the number of sage grouse hunters is controlled with a specific number of tags issued within each wildlife management unit with a season that is less than one week long.

Hunting of pheasants, valley quail, chukar, and Hungarian partridge is much more important; however, the amount of hunting is tied very closely to annual availability of birds, which is highly dependent on annual production. Production tends to be highly variable between years depending on weather conditions during the nesting season and winter weather severity which affects over-winter survival.

Trapping and hunting for fur is the primary recreational use of furbearers within the basin; the fur is prepared and sold for clothing manufacture. Participation varies from year to year depending on fur prices. Generally, there are far fewer trappers than there are big game or upland gamebird hunters. Although the coyote is not classified as a

furbearer, coyote hunting for fur and sport is very popular within the basin. Since most furbearers are either nocturnal or very secretive in nature, there is very little opportunity for viewing.

Fishing

The Malheur basin supports a diverse group of fisheries, ranging from alpine trout fisheries to reservoir warm water fisheries. Some of the fisheries are small, attracting a few anglers per year, while the large reservoir fisheries attract thousands of anglers each year.

Angler preference is split equally between warm water and cold water species. Effort generally peaks in the spring prior to the heat of the summer. Effort drops during the summer, picks up again in the fall, and is light in the winter.

Anglers that come to southeast Oregon, which includes this basin, can be divided into three groups. About one-third of the anglers are non-resident, primarily from Idaho. About one-third are Oregon residents from outside the southeast, and the rest are Oregon residents from southeast Oregon. With the large number of reservoirs in the area, many anglers prefer angling from boats. Bank fishing and float tubes are also popular with a large number of trout anglers.

Angler preference is split equally between warm water and cold water species. Effort generally peaks in the spring prior to the heat of the summer, drops during the summer, and picks up again in the fall. During winter, fishing effort is light.

Fishing opportunities are described by subbasin as follows:

Lower Willow Creek Subbasin

No game fish populations are consistently found in Lower Willow Creek. Populations of suckers, squawfish, shiners, and dace can be found at times.

Upper Willow Creek Subbasin

Malheur and Pole Creek reservoirs support the largest rainbow trout fisheries in this basin. There are also very small fisheries on tributaries upstream of the reservoir. These tributaries contain redband trout. Most flow through private land and access is limited.

North Fork Subbasin

The trout fishery on Beulah Reservoir is the largest in this unit. Bull and rainbow trout abound here in addition to redband trout. The streams upstream of Beulah also support a redband trout fishery. There is also a catch and release

fishery on bull trout in the streams upstream of the reservoir. The section of the North Fork Malheur River between the reservoir and Crane Creek is very popular with trout anglers. It has a reputation for producing good numbers of large trout.

Middle Fork Subbasin

This basin supports the most diverse group of fisheries in the basin. Warm Springs Reservoir supports fisheries on several species of warm water fish including large and smallmouth bass, yellow perch, bluegill, crappie, bullhead, and channel catfish. Rainbow trout are also present in Warm Springs Reservoir.

Access can be difficult at times. There is a small warm water fishery in the main stem, primarily of smallmouth bass, upstream to Highway 20. In the past, the main stem in Drewsey Valley supported a small trout fishery. Much of the river flows through private land and access is limited. The canyon reach upstream of Drewsey Valley supports a popular fishery of trout. This reach has a reputation of producing good numbers of large trout. Streams in Logan Valley support fisheries on redband and brook trout. Small ponds throughout the unit support both trout and warm water fisheries.

Main Malheur and South Fork Subbasins

There are few angling opportunities in these subbasins. The catfish fishery on the Snake River is the largest fishery in this resource unit. A very small fishery on catfish, smallmouth bass, and carp (*Cyprinus carpio*) exists on the Malheur River. There are several small ponds that provide mostly warm water fishing opportunities throughout the unit. Most of these ponds are privately owned with limited access.

Upstream of Namorf Dam there is a small trout fishery. There are several small stock water ponds in the headwater areas of tributaries that support small trout fisheries. Populations are small and can be reduced very quickly. There is a tailrace trout fishery downstream of Warm Springs Dam on the Middle Fork. It has a reputation of producing good numbers of large trout.

Cottonwood Creek headwaters contain redband trout. The fisheries in the South Fork watershed are very small and consist mostly of small, privately owned ponds with limited access.

APPENDIX 7

FEDERAL LAND MANAGEMENT

Management will be guided by the Interior Columbia River Basin Ecosystem Management Project. The environmental impact statements for this project are currently out for review. Therefore, this section will summarize management strategies outlined in current federal resource management plans.

BUREAU OF LAND MANAGEMENT (BLM)

The BLM manages 47% of the lands within the Malheur basin. Their management criteria are outlined in the Three Rivers and Vale District Resource Management Plans. The Three Rivers Area covers most of the Malheur River basin in Harney County. The Malheur Resource Area includes the Malheur basin east of Harney County.

WALLOWA-WHITMAN NATIONAL FOREST (WWNF)

The only portion of the Malheur basin administered by the WWNF is located in the headwaters of Willow Creek. The Wallowa-Whitman Management Plan proposes to adopt the following alternative for management of this area: "Timber and forage production are emphasized. Recreational opportunities are provided in a managed forest setting. Special considerations are given to sensitive visual areas and riparian zones. Open public road access during critical periods of big game use is generally not more than 1.5 miles per square mile."

Five groves of old growth timber occur in this area. They will be "managed to provide wildlife habitat, preserve aesthetics, and maintain ecosystem diversity."

MALHEUR NATIONAL FOREST

The Malheur National Forest includes 246,000 acres of the Middle Fork subbasin and 130,000 acres of the North Fork subbasin.

According to the preferred alternative, most of the lands outside of Special Management Areas (Wilderness, Wild, and Scenic Rivers) would be managed primarily for "general forest" (timber production and other multiple uses on a sustained-yield basis) and rangeland (livestock forage production and other multiple uses on a sustained-yield basis.) Lower elevation lands adjacent to BLM lands would be managed for big-game winter range (maintain usable forage for elk and deer on potential winter range.) Table 7-1 and maps of the Management Areas are located following page 7-2.

Areas adjacent to Special Management Areas would be managed as visual corridors, with primary consideration given to their scenic quality and the growth of large diameter trees.

Table 7-1

Malheur National Forest Land and Resource Management Plan
Management Areas

Management Area (MA) #	Areas
1	General Forest
2	Rangeland
3A	Non-Anadromous Riparian Areas
3B	Anadromous Riparian Areas
4A	Big Game Winter Range
5	Bald Eagle Winter Roosts
6A	Strawberry Mtn Wilderness
6B	Monument Rock Wilderness
7	Scenic Area
8	Special Interest Area
9	Research Natural Area
10	Semi-Primitive Non-Motorized Recreation Area
11	Semi-Primitive Motorized Area
12	Developed Recreation Areas
13	Old Growth
14	Visual Corridors
15	Minimum Level Management
16	Administration Sites
17	Wildlife Emphasis Area with Non-Scheduled Harvest
22	Wild and Scenic Rivers

The northwest portion of the North Fork Malheur would be managed for a wide range of semi-primitive non-motorized recreation opportunities, while protecting existing environment quality.

SPECIAL MANAGEMENT AREAS

A map of the Malheur Basin Special Management Areas is located following page 7-4.

Wilderness Areas

Strawberry Mountain: Approximately 15 of the 107 square miles (68,480 acres) of wilderness comprise the northwest corner of the Malheur basin. It is administered as part of the Malheur National Forest.

Monument Rock: This wilderness straddles the northern boundary of the Malheur basin. The southern half (19.7 square miles-12,608 acres) lies within the North Fork basin unit and is administered by the Malheur National Forest.

Wilderness Study Areas

There are three Wilderness Study Areas within the Malheur basin. They are the Camp Creek Group, Castle Rock, and Beaver Dam Creek.

The Camp Creek Group includes Camp Creek, Cottonwood Creek, Gold Creek, and Sperry Creek for a total of 46,860 acres. The majority of the study area is recommended for wilderness designation.

The Castle Rock area located 26 miles north of Juntura supports stands of ponderosa pine with Douglas-fir, western juniper, and mountain mahogany. Castle Rock itself is the most prominent feature at an elevation of 6789 feet and includes 6,200 acres. The BLM's recommendation for Castle Rock area is a no wilderness designation.

The Beaver Dam Creek study area is located 14 miles south of Ironside and US Highway 26 and includes 19,589 acres. This Wilderness Study Area has a mountainous appearance due to the many ridges and draws. Numerous perennial and intermittent drainages empty into Bully Creek, which runs through mostly private land near the middle of the Wilderness Study Area. The recommendation by BLM on this study area was for a no wilderness designation.

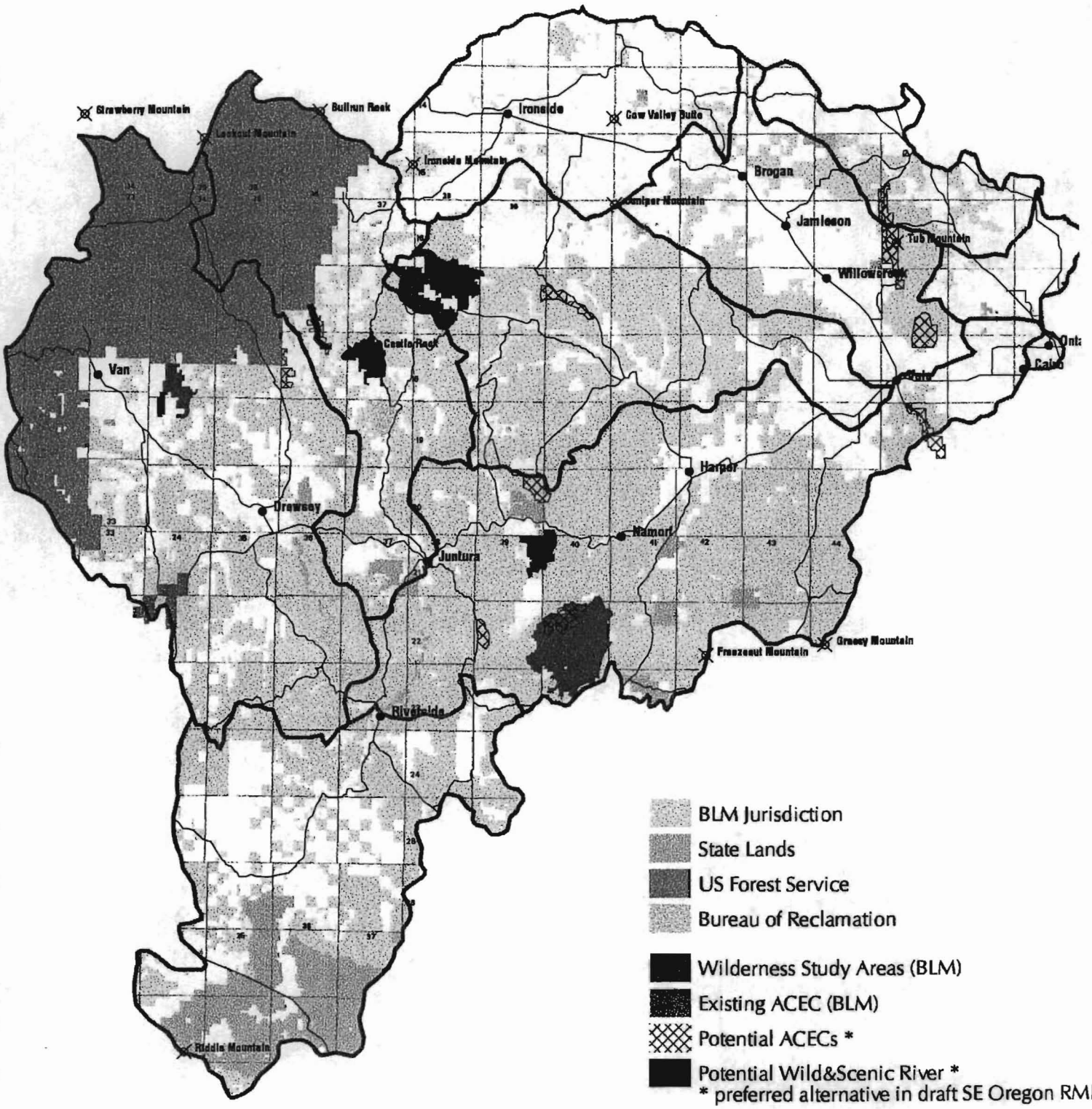
Table 7-2 lists the Areas of Critical Environmental Concern (ACEC) and Research Natural Areas (RNA) proposed by BLM.

Table 7-2

Areas of Critical Environmental Concern /Research Natural Areas
Proposed by BLM

Name	Designation	Size	Location	Reason
Black Canyon	ACEC/RNA	3,680	Jonesboro	Vegetation community
Castle Rock	ACEC	20,720	Juntura	Cultural, scenic, wildlife
Lake Ridge	ACEC	3,460	Juntura	Wildlife habitat Vegetation community
North Fork Malheur	ACEC	1,910		Bull trout, scenic, wildlife
North Ridge Bully	ACEC/RNA	2,400		Vegetation community Sage grouse
Oregon Trail	ACEC	13,000	Kenney Pass, Tub Mtn, Birch Creek	
Ott Mountain	ACEC/RNA	1,280	Juntura	Old growth ponderosa
South Alkali Sand Hills	ACEC/RNA	4,320	Vale	Special status plants
South Bull Canyon	ACEC/RNA	1,160	Juntura	Vegetation community
South Ridge Bully	ACEC/RNA	1,920	Westfall	Vegetation community
Biscuitroot Cultural	ACEC/RNA	6,500		Native American Root Gathering Area
Stinkingwater Pass	ACEC			Native American uses

Malheur Basin Special Management Areas



US Dept. of the INTERIOR
Bureau of Land Management
Burns District, Oregon
Map prepared 1/27/98, Pam Keller, malsma.aml

0 1 2 3 4 5 6
MILES
Scale: 1 inch = 12.6 miles

Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

Wild and Scenic Rivers

Eligibility: One or more outstanding, remarkable values
Several Congressional designated Wild and Scenic areas within the Malheur basin include:

Middle Fork Malheur
Scenic area is 4.9 miles from Bosenberg Creek to Malheur Ford.
Wild area is 6.9 miles from Malheur Ford to Malheur National Forest boundary.

North Fork Malheur
Scenic area is 22.8 miles from headwaters to the Malheur National Forest boundary.

Other waterways under study and determined to be eligible for potential inclusion in the Wild and Scenic River System include:

Name	Tentative Classification	Outstanding/Remarkable Value
Black Canyon Creek	Wild	Plants
Canyon Creek (Harper)	Wild	Fish
Cottonwood Creek	Wild	Fish
Dry Creek	Wild-lower Wild-middle	Fish, wildlife hydrology, geology
Malheur River	Recreation	Wildlife, recreation
North Fork Malheur	Wild-upper Recreation-lower	Scenery, recreation, fish, wildlife
Middle Fork Malheur (Bluebucket Creek)	Wild	Scenery, solitude, vegetation, recreation
South Fork Indian (Bully)	Wild	Scenery
South Fork Carter Creek	Wild	Fish