

3.0 Affected Environment and Environmental Consequences

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

Chapter 3 is organized by resource topic. Resource topics analyzed in detail include soils, hydrology and water quality, vegetation, fish and wildlife, threatened and endangered species, recreation, visual resources, land use, socioeconomics, public services and utilities, environmental justice, cultural resources, Indian sacred sites, Indian Trust Assets (ITAs), and transportation and access. Climate, air quality, geology, and topography are not discussed because early in the scoping and analysis process, no potential impacts were identified regarding these resources.

The affected environment is addressed first and describes the current conditions for each resource within Reclamation lands. This is not a comprehensive discussion of every resource within the RMP study area, but rather focuses on those aspects of the environment that were identified as issues during scoping or would be affected by the alternatives.

The effects of the alternatives are described next in the environmental consequences section for each resource topic. Under the alternatives subheading, the specific impacts of each of the alternatives are discussed in terms of the actions that would occur and specific information about the impact. Only impacts that cannot be fully avoided through the application of best management practices (BMPs), listed in Chapter 5, are described.

In the environmental consequences section, the depth of analysis of the alternatives corresponds to the scope and magnitude of the potential environmental impact. This chapter compares the effects of the three alternatives described in Chapter 2:

- Alternative A – No Action Alternative: Continuation of Existing Management Practices
- Alternative B – Natural Resource/Dispersed Recreation Balance
- Alternative C (Preferred Alternative) – Natural Resource Protection/Formal Recreation Emphasis

Alternatives B and C (Preferred Alternative) are Action Alternatives. Alternative A, the No Action Alternative, describes the future under the 1992 RMP – i.e., if the updated RMP were not implemented. Under this scenario, management of Prineville Reservoir lands would continue under the 1992 RMP. Impacts from the Action Alternatives are compared to the No Action Alternative. A description of the affected environment and environmental consequences is presented for each of the alternatives. Mitigation measures and residual impacts remaining after implementation of mitigation measures are described only for the Preferred Alternative. Cumulative impacts are presented for each of the alternatives and are described in Section 3.1.1. A summary of impacts for each alternative is provided at the end of Chapter 2.

3.1.1 Cumulative Impacts

Reasonably foreseeable cumulative impacts were identified for the continued population increase in the vicinity and the resulting potential increase in recreation use at Prineville Reservoir.

There has been a large increase in population in the vicinity of Prineville Reservoir in the 10 years since the last RMP was prepared, with a corresponding increase in recreation use at the reservoir. Central Oregon's three counties (Crook, Deschutes, and Jefferson) were among the fastest growing in the state during the past decade. Deschutes led the state with a 54 percent growth rate, while Jefferson ranked fourth in the state (38 percent) and Crook ranked fifth (34 percent) (U.S. Census 2001). For the year 2000, there were 102,694 overnight visits at the Prineville State Park and 85,432 overnight visits in 2001. Visits for 2001 were slightly lower because of the drought and low reservoir levels (pers. comm., Perkins, 2002). See Section 3.7 (Recreation) for details regarding recreation use.

Recreation demand is likely to continue to increase under all alternatives and would have effects on a number of resources without appropriate management actions. While it is difficult to estimate the rate of increase in future recreation demand, the effects on resources can be limited and managed by the type and amount of capacity allowed on the Reclamation lands. The alternatives include provisions for controlling recreation use that will reduce but not eliminate cumulative effects from increased recreation use at Prineville Reservoir.

3.2 Soils

3.2.1 Affected Environment

Soils in the vicinity are derived from ancient lake-deposited sediments, with profiles consisting of a clay loam surface horizon over a clay-textured subsoil. These soils are notoriously slick and sticky when wet. Erosion-prone soils occur on more than 90 percent of the reservoir shoreline (BLM 1980), and combined with the steep slopes surrounding the reservoir pose an erosion potential if disturbed by excess human activity.

The dry climate of the Prineville area has led to the formation of poorly developed, loamy/stony sandy loam, erosion-prone soils. The ten soil types that occur in the vicinity of the Prineville Reservoir are shown in Table 3.2-1 and Figure 3.2-1.

Erodible soils are present along more than 90 percent of the reservoir shoreline (Reclamation 2002). The Stukel-Lorella soil association occurs over most of the study area. Stukel soils are shallow and well-drained with a slow permeability, rapid runoff, and a high erosion potential. The surface layer is a

Table 3.2-1: Soil types adjacent to Prineville Reservoir.

U.S. Soil Conservation Service Map Unit*	Soil Type	Slope	Depth to Bedrock	Erosion Hazard	Soil Characteristics
172E	Stukel-Lorella	3-30%	10-20 in	moderate to high	shallow, well-drained; moderate permeability; loam/stony sandy loam
151-172E	Stukel-Simas	3-30%	10-20 in	high	shallow (Stukel) deep (Simas) well-drained; moderate to slow permeability; loam/sandy loam
46-48D	Choptie-Madeline	1-30%	10-20 in	moderate	shallow, well-drained, moderate to slow permeability; loam/stony sandy loam
133F	Redcliff-Rock Outcrop Complex	30-65%	20-40 in	high	deep, well-drained; moderate permeability; stony/cobbley loam
118E	Redcliff Rock Outcrop Complex	5-30%	20-40 in	moderate	deep, well-drained; slow permeability; loam/clay/clay loam
151F	Simas Loan	30-70%	> 60 in	high	deep, well-drained; moderate permeability; stony loam/very gravelly loam/gravelly clay loam
152F	Searless Stony Loam	30-65%	20-40 in	moderate	deep, well-drained; moderate permeability; stony loam/very gravelly loam/gravelly clay loam.
175E	Willowdale	0-2%	> 74 in	slight	deep, well-drained; moderate permeability; loam; calcareous below 18 in.
151E	Simas Sandy Loam	5-30%	> 60 in	high	deep, well-drained; slow permeability; sandy loam/clay/clay loam
33F	Fren Sandy Loam	30-60%	> 65 in	moderate	deep, well-drained; moderate permeability, sandy loam/gravelly loam/gravelly clay loam

* Original soil map units.

grayish brown loam about 7 inches deep. The Lorella series is a shallow, well-drained soil with a slow permeability, rapid runoff, and a moderate erosion potential. The soil is typified by grayish brown, very stony loam about 3 inches deep, with stones about 3 to 15 feet apart on the surface.

The soils of the Prineville Reservoir watershed area have formed from three basic kinds of parent material: (1) material from weathered bedrock and local movement on slopes; (2) pumice from geologically recent volcanic activity; and (3) alluvium deposited on floodplains, alluvial fans, and low benches. Bedrock of the vicinity is dominated by volcanic flows, tuffs, breccias, and tuffaceous sedimentary rock. Tuff is a rock consisting of cemented and hardened volcanic ash.

Potential soil erosion from lands surrounding Prineville Reservoir is a long-standing concern of land managers (BLM 1975; BLM 1980; OSU 1976) because of the predominance of erosion-prone soils in the watershed and continuing soil loss. Recent data indicate that the reservoir loses about 123 af in capacity per year from sedimentation from the contributing 2,700 square mile drainage area (Reclamation 1999).

Cryptobiotic crusts are soil crusts formed by living organisms and their byproducts, creating a crust of soil particles bound together by organic materials. Crusts are predominantly composed of cyanobacteria, green and brown algae, mosses, and lichens. These crusts affect processes that occur at the land surface or soil-air interface and include soil stability, nitrogen fixation, nutrient contributions to plants, infiltration, seedling germination, and plant growth (BLM et al. 2001). Soil crusts were once widespread in eastern Oregon deserts but have been disturbed by human use, off-road vehicles, and livestock. Much of Reclamation's lands around Prineville Reservoir have a long history of disturbance from a variety of factors and no longer include a high occurrence of soil crusts. Vegetation surveys indicate that areas in the downstream half of the reservoir where access is difficult have a high occurrence of soil crusts on Reclamation lands at Prineville Reservoir. It should be noted, however, that the occurrence of soil crusts was estimated from aerial photo interpretation and vegetation mapping with limited field verification.

3.2.2 Environmental Consequences

A primary concern for all alternatives is the occurrence of erosion-prone soils around the reservoir. Land-disturbing activities such as vegetation disturbance or removal, off-road vehicle use, and livestock grazing are potential disturbance factors that could lead to excess erosion. The following narrative describes the effects of the three alternatives on soil resources around Prineville Reservoir. Under all alternatives the operation of the reservoir and the ensuing erosion of soils in the drawdown zone would continue. Improvement to soil erosion conditions would occur for all alternatives, where current dispersed camping patterns would be changed to mostly designated campsites, but this assumes that enforcement and improved signage would accompany facility improvements. In addition, it is assumed that planting of native or transition vegetation would be implemented in conjunction with any recreation site improvements, as outlined in the BMPs listed in Chapter 5.

Table 3.2-2 summarizes the approximate area of disturbance for improved, expanded, or new facilities under the various alternatives. The effects of these activities are discussed under the appropriate alternative below.

**Prineville Reservoir Resource Management Plan
Environmental Assessment**

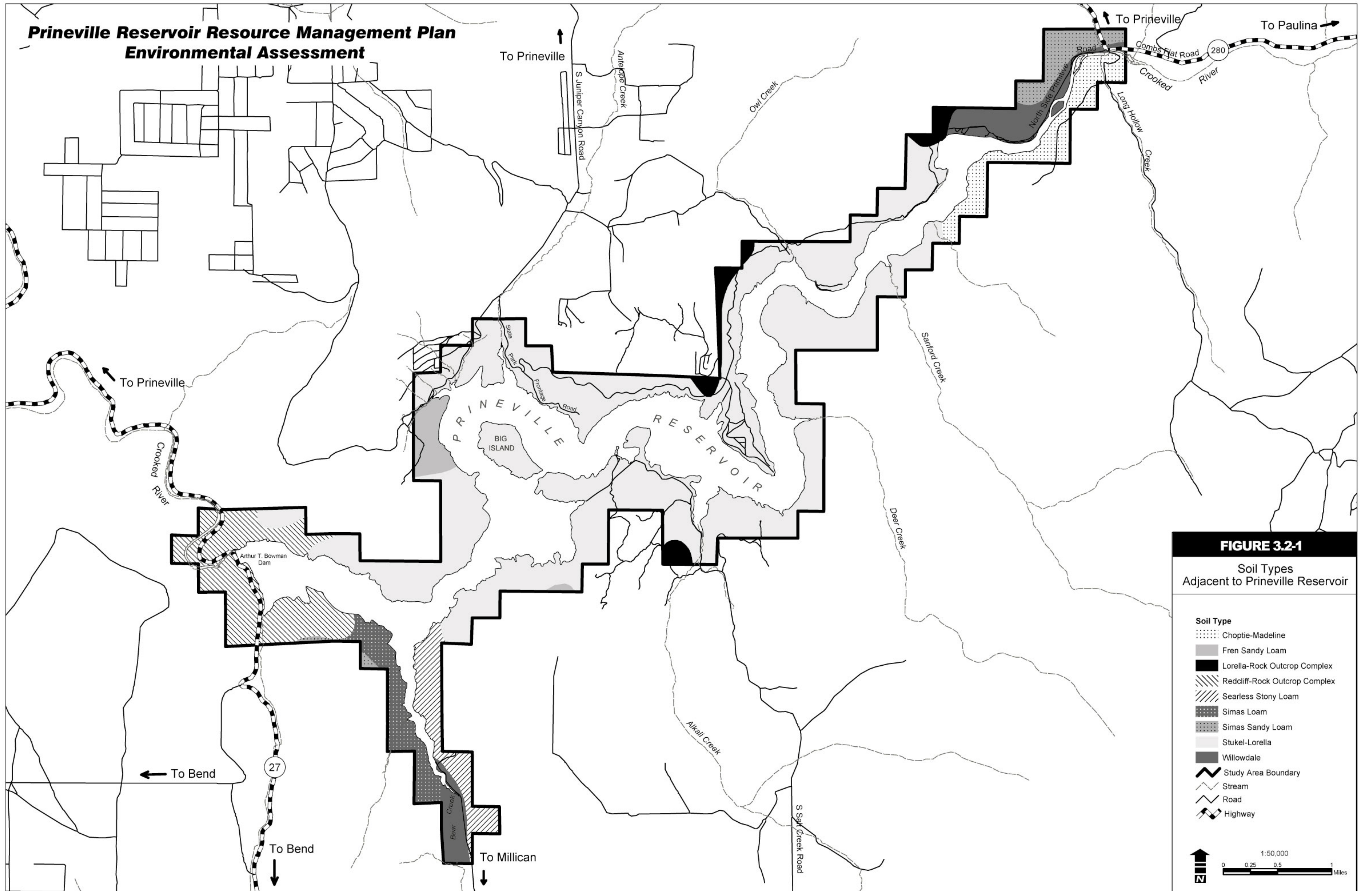


FIGURE 3.2-1
Soil Types
Adjacent to Prineville Reservoir

Soil Type

- Choptie-Madeline
- Fren Sandy Loam
- Lorella-Rock Outcrop Complex
- Redcliff-Rock Outcrop Complex
- Searless Stony Loam
- Simas Loam
- Simas Sandy Loam
- Stukel-Lorella
- Willowdale
- Study Area Boundary
- Stream
- Road
- Highway

1:50,000
0 0.25 0.5 1 Miles

Table 3.2-2: Area of disturbance for selected facilities under the Prineville RMP alternatives.

Development Area	Alternative	Approximate Area of Disturbance (acres)
County Boat Ramp	A	7.4
	B	7.4
	C	7.4
State Park North and Antelope Creek	A	N/A
	B	13.1
	C	26.0
Roberts Bay	A	19.8
	B	22.6
	C	37.5
Powder House Cove	A	4.8
	B	7.0
	C	6.9

N/A – not applicable

3.2.2.1 Alternative A - No Action, Continuation of Existing Management Practices

Continued efforts to increase enforcement of off-road vehicle use on Reclamation lands would reduce the disturbance of soils and the subsequent increased runoff into the reservoir. Restrictions on vehicles driving along the reservoir shoreline and drawdown zone would also reduce erosion sources. The continued application of barriers to vehicles in strategic areas would continue to improve soil conditions, allow for restoration, and reduce the potential for excess erosion. While the continued seasonal closure of the North Side Primitive Road through the SWA is primarily for wildlife management purposes, it has some marginal beneficial effect for soil resources by eliminating traffic at the time of the year when soils are saturated and prone to disturbance and rutting.

Development and implementation of a Habitat and Wildlife Management Plan would include restoration of disturbed vegetation zones, which would likely reduce erosion and sedimentation. Improved fencing and the elimination of livestock grazing along riparian zones, shorelines, and wetlands would improve the integrity of these plant associations. Disturbing soil crusts by livestock grazing can increase erosion that leads to range deterioration (USGS et al. 2001; Johansen 1986). Implementation of improved fencing and limiting recreation use (i.e., no formal facilities) in areas of high occurrence of cryptobiotic crusts (Bear Creek drainage) would reduce disturbance and aid in maintaining integrity of soil crusts.

Maintaining the south shoreline of the SWA as a day use area only would limit human-caused impacts to vegetation and shoreline soils, which would maintain the integrity of these resources and assist in stabilizing the shoreline and reducing soil erosion. Dispersed day use and camping in other areas of the reservoir would continue to have minor effects to soil erosion from soil compaction and vegetation disturbance.

Designating camping or day use only sites at Owl Creek, Juniper Bass, Cattle Guard, and Old Field would eliminate the random pattern of camper use in the vicinity, which would lead to a more limited area of vegetation disturbance and soil compaction. In addition, vegetation restoration efforts of disturbed areas around the designated campsites would aid in reducing soil erosion. The continued random pattern of camping and road use along the upper northside shoreline in the SWA around Combs Flat would be a continual source of widespread soil disturbance and erosion.

Construction would disturb about 7.4 acres of soil related to improvements at the County Boat Ramp (same for all alternatives). Expansion of the State Park Campground on the north shore has the potential for short-term increases in soil erosion, particularly during vegetation removal and earth-moving.

Approximately 26 acres of ground would be disturbed. This risk would be minimized by implementing standard construction BMPs identified in Chapter 5. Site selection and timing of construction also would aid in minimizing the potential for excess erosion and sedimentation. Similar precautions would be implemented for the development of the Antelope Creek Day Use Area. While implementation of BMPs would minimize adverse effects, the increase in developed facilities and the continued increase in recreation use would result in increased soil compaction and vegetation removal in the expansion areas. However, irrigated lawns, fencing and designated trails to contain recreationists within designated areas are tools to reduce significant erosion impacts within the expansion areas. While fencing and designated trails would minimize recreation impacts following construction, recreation use impacts would not be eliminated.

Improvement of the boat ramp access and parking at Powder House Cove would provide minor benefits to soil erosion by providing proper road widths and turn-around area, which would reduce traffic impacts off the road shoulder. These revisions would disturb about 4.8 acres during construction. Similarly, designating a parking area at Bear Creek would limit the area of soil compaction and disturbance. Maintaining the current dispersed recreation use pattern at Juniper Point would have continued soil disturbance and continue to provide a sedimentation source. Designating campsites at Roberts Bay East would aid in reducing the random pattern of camping and road networks under current conditions and would reduce erosion if accompanied by revegetation. Construction would disturb about 19.8 acres of land. Maintaining existing dispersed recreation use patterns at Roberts Bay West would represent a continued degradation of soil and vegetation and a continued source runoff and sedimentation. Improvements to the Roberts Bay Road would provide minor benefits in improving soil stabilization.

Mitigation and Residual Impacts [Alternative A]

No mitigation measures are proposed for Alternative A because the actions under this alternative do not have substantial adverse impacts on soils in the RMP study area. BMPs listed in Chapter 5 (Environmental Commitments) are included for all alternatives. The residual impacts are previously discussed in more detail in the above narrative.

Cumulative Impacts [Alternative A]

Under all alternatives, it is likely that increased boating use of the reservoir would occur, which would increase wave action and erosion of the shoreline. These actions are negligible in comparison to the effects of reservoir fluctuation on shoreline erosion, however. Continued increases in recreation use of Reclamation lands, especially in undesignated areas, would increase vegetation and soil disturbance, soil compaction, and erosion. While provisions for controlling recreation use would reduce these impacts, they would not be eliminated.

3.2.2.2 Alternative B - Natural Resource/Dispersed Recreation Balance

Effects on soil and erosion under Alternative B would generally be similar to those described under Alternative A, with a few exceptions. Increased juniper management may increase the density of native grasses and forbs if it is conducted in a proven approach, and is completed by crews with chainsaws rather than operations with tracked vehicles. Improvement of native species through implementation of the Integrated Pest Management Plan and habitat restoration efforts under Alternative B also would reduce soil erosion, although these efforts would be concentrated in the SWA.

Continuing the existing recreation use patterns in the SWA will have adverse effects to soil resources from uncontrolled camping patterns, informal road networks, and general vegetation and soil disturbance. These uncontrolled use patterns would have a greater negative impact than the control measures identified under Alternative A. Construction of improved recreation facilities at the Prineville Reservoir Resort have the potential to increase short-term soil erosion; with the implementation of BMPs, however, this would be negligible. Construction would disturb about 26 acres at the Expanded State Park North and Antelope Creek Day Use Area, 22.6 acres at Roberts Bay, and about 7 acres at Powder House Cove. Use of BMPs is expected to control excess erosion during construction.

Conditions would improve at Juniper Point under Alternative B by providing designated campsites, which would reduce random use patterns and the subsequent disturbance to vegetation and soils. The addition of gravel roads also would reduce soil erosion at Juniper Point. While the improvements to Roberts Bay East and West would increase the amenities, it also would reduce the sprawl of camping use and road networks under the current conditions and would thus improve conditions by reducing soil compaction, erosion, and vegetation loss.

Mitigation and Residual Impacts [Alternative B]

No mitigation measures are proposed for Alternative B because the actions under this alternative do not have substantial adverse impacts on soils in the RMP study area. BMPs listed in Chapter 5 (Environmental Commitments) are included for all alternatives. The residual impacts are previously discussed in more detail in the above narrative.

Cumulative Impacts [Alternative B]

Cumulative impacts would be slightly less than those described under Alternative A. While Alternative B provides for more controlled camping on the south shore of the reservoir, dispersed camping would continue in the SWA. Vegetation loss and a corresponding increase in soil compaction and erosion would be associated with increased visitor use.

3.2.2.3 Alternative C - Natural Resource Protection/Formal Recreation Emphasis (Preferred Alternative)

Alternative C would have similar effects as those described under Alternative B except where noted in the following discussion. The provisions for increased visitor education and reduced vehicle access to the North Side Primitive Road would likely result in a reduction of off-road vehicle use, which would reduce soil erosion. The increased emphasis on road rehabilitation and restoration of disturbed sites and off-road vehicle tracks would provide benefits to soil resources. Provisions to more precisely define the occurrence of cryptobiotic soils and impacts to these areas will result in benefits to the resource. In addition, the emphasis of protecting areas with a high occurrence of cryptobiotic crusts from disturbing factors such as off-road vehicle use, off-trail exploration by hikers, and livestock grazing would aid in maintaining these relatively undisturbed soil complexes and reduce excessive soil erosion.

Improved coordination with BLM juniper management efforts would provide minor benefits to soil resources by improving native grass and forb cover, if completed in conjunction with livestock control.

Construction of the new entrance and boat ramp at Powder House Cove has the potential to increase short-term erosion during the construction phase, and would disturb about 6.9 acres. Implementation of BMPs (identified in Chapter 5) would substantially reduce this risk. The large development of a new boat ramp, parking and day use facilities would increase the area of the site that is unvegetated and

would likely increase damage to surrounding vegetation and soil without long-term mitigation strategy such as fencing and storm water drainage management. Even with the implementation of BMPs, some adverse effects to the soil from compaction and increased run-off would be expected, although at a minor level. Construction also would disturb about 26 acres at the Expanded State Park North and Antelope Creek Day Use Area and 37.5 acres at Roberts Bay. While the construction areas are larger than under other alternatives, the resulting controlled camping would reduce dispersed use that is currently causing vegetation loss, soil compaction, and erosion.

Implementation of designated campsites at the SWA including Combs Flat would substantially improve the current use patterns and reduce the area of shoreland and upland erosion. Under the proposed development of recreation facilities at Roberts Bay East, parking and day use facilities would eliminate the random pattern of camping and day use under the current conditions. The improvements to the site conditions would be greater than those described under Alternative B due to complete conversion of the road-accessed recreation sites to designated use only.

Mitigation and Residual Impacts [Alternative C]

No mitigation measures are proposed for Alternative C because the actions under this alternative do not have substantial adverse impacts on soils in the RMP study area. BMPs listed in Chapter 5 (Environmental Commitments) are included for all alternatives. The residual impacts are previously discussed in more detail in the above narrative.

Cumulative Impacts [Alternative C]

Cumulative impacts would be slightly less than those under Alternative A or B because developing formal camp sites at Roberts Bay and in the SWA would reduce the long-term impacts associated with greater recreation use. The use of designated campsites in the SWA and at Roberts Bay would reduce, but not eliminate, effects to soil from increased recreation use of Prineville Reservoir.

3.3 Hydrology and Water Quality

3.3.1 Affected Environment

3.3.1.1 Surface and Groundwater

The Crooked River basin above Bowman Dam drains about 2,700 square miles. Annual runoff from the basin is about 270,000 af, but this is variable and has ranged from a high of 687,834 af in 1984 to a low of 38,853 af in 1961. Peak inflow has been recorded at 267,500 cfs. The highest recorded flow in the Crooked River was 8,410 cfs in March 1952. Flows are typically 200 to 250 cfs during the summer irrigation season and 30 to 75 cfs during the winter storage season (ODFW 1996).

Two primary tributaries flow into Prineville Reservoir—Bear Creek and Sanford Creek. Bear Creek is located on the south side of the reservoir and on the western end. Bear Creek originates above Antelope Flat Reservoir on the south side of the Maury Mountains. Bear Creek and its many tributaries drain about 260 square miles, or about 10 percent of the basin upstream of Prineville Reservoir. Eroded cutbanks are evident along much of the stream, which is characterized by high summer temperatures, low flows, and high turbidity. The ratio of sediment load to water volume is high for Bear Creek, which flows through highly erodible soils. Sanford Creek originates in the northwest corner of the Maury Mountains, and its basin consists of about 20 square miles. Most of Sanford Creek flows through sagebrush and juniper stands (ODFW 1996). Secondary tributaries to Prineville Reservoir include Alkali Creek, Deer Creek, Long Hollow Creek, Eagle Creek, and Antelope Creek.

Under the Congressional authorization for the Crooked River Project, Reclamation is required to release a minimum flow of 10 cfs from Bowman Dam. In February 1990, Reclamation administratively increased the minimum flow to 75 cfs in recognition of the regionally outstanding natural and recreational resources provided by the downstream reach of the Crooked River under the Federal Wild and Scenic River Act. The 75 cfs is dependent on water availability, but Reclamation's goal is to release at least 30 cfs even in low water years.

Groundwater is readily available along the reservoir margin, but on ridges and plateaus above the reservoir water wells must be drilled to between 200 and 800 feet to encounter the aquifer. A 400-foot deep well that was drilled in 1975 for the Jasper Point Recreation site yields 20 to 30 gallons per minute (Reclamation 1992).

3.3.1.2 Water Quality

Water quality is generally good and is suitable for all beneficial uses in Prineville Reservoir and in the Crooked River below Bowman Dam. The water quality of Prineville Reservoir and Crooked River downstream of Bowman Dam is suitable for the beneficial uses as defined by the State of Oregon's Department of Environmental Quality (ODEQ 2001). Data collected by the Bureau of Reclamation, summarized in Table 3.3-1, indicate that the water quality standards and beneficial uses identified by ODEQ for the Deschutes River basin (which includes the Crooked River subbasin) are being met in most instances. The statewide standard for dissolved oxygen for warm water is 5.5 parts per million (ppm) (30-day mean minimum) and 126 units/ml for fecal coliform. Other specific standards for the Crooked River basin have not been developed.

Table 3.3-1: Water quality (1973, 1978, 1979, 1984, 1991, and 1995) Prineville Reservoir and Crooked River below Bowman Dam (mg/L except where noted).

Measured Parameter	Location								
	Prineville Reservoir ¹					Crooked River			
	July ² (1984, 1995)	Aug (1984)	Sept (1979)	Oct (1979)	Nov (1978)	July ² (1984, 1995)	Aug ² (1984, 1991)	Sept (1973)	Nov (1978)
Temperature (°C)	23.2	20.9	17.8	17.2	6.4	10.7	11.7	---	5.6
Dissolved Oxygen	8.1	7.0	9.0	8.5	9.4	11.6	10.5	12.1	13.0
pH (Standard Units)	8.30	8.70	8.10	7.80	8.10	8.00	7.95	7.68	7.90
Total Phosphorus	0.031	0.018	0.022	0.055	0.050	0.076	0.091	0.12	0.057
Ortho Phosphorus	0.010	0.005	0.004	0.005	0.032	0.062	0.063	0.08	0.041
Nitrate + Nitrite as Nitrogen	<0.10	<0.10	0.06	0.04	0.10	<0.10	0.15	---	0.10
Fecal Coliform (Counts/100mL)	<2	<2	---	---	<2	4	<2	---	---
Turbidity (NTU)	2.0	3.0	2.0	1.0	3.0	12.5	12.5	9.0	4.0
Transparency Secchi (meters)	2.2	4.0	---	---	1.8	---	---	---	---
Chlorophyll A	0.002	---	---	---	---	---	---	---	---

Source: Reclamation undated.

¹ Surface data used for reservoir.

² Average data presented for months with multiple years of data.

Prineville Reservoir surface water temperatures during July and August often exceed the temperature standard for cold water aquatic life (17.8°C). Profile data collected at Prineville Reservoir during July and August of 1985 and 1995 indicate that there are temperatures less than 17.8°C in the bottom 50 percent of the reservoir. Dissolved oxygen levels in the reservoir decrease somewhat during July and August but not to a level that would be indicative of eutrophication conditions.

Nutrients (nitrogen and phosphorus) were detected in sufficient quantities to support plant growth in the reservoir. Nutrient concentrations indicate a potential for algal blooms and eutrophic conditions. Because reservoir inflow and discharge into the Crooked River are turbid during most times of the year, it is suspected that the turbid conditions reduce light penetration to the extent that photosynthetic activity and plant growth are limited. This is supported by the low concentrations of chlorophyll A and dissolved oxygen depletion in the lower levels of the reservoir during the summer months (ODFW 1996).

According to Section 303(d) of the Federal Clean Water Act, ODEQ lists water bodies where one or more water quality standards are not being met. This 303(d) list includes the mainstem Crooked River from its mouth to Baldwin Dam (about 8 miles upstream of Prineville Reservoir) due to flow modification and pH. The section of the Crooked River from Baldwin Dam to Prineville Reservoir is listed because of problems with total dissolved gas levels. The Lower Crooked River subbasin (which includes Prineville Reservoir) is listed as a Priority 2 watershed by ODEQ for development of Total Maximum Daily Load (TMDL) for water quality parameters, with Level 1 being the highest priority and Level 4 the lowest priority. The criteria for a Priority 2 water body applicable to the Lower Crooked River are candidate fish species and water contact recreation. Wild and Scenic River status is considered a second tier criterion when prioritizing water bodies. There is no current TMDL process for the Crooked River, but it is scheduled for 2004 to 2010 (ODEQ 2002).

Turbidity is caused by suspended particles that block the passage of light. Turbidity is considered a negative visual effect due to its cloudy appearance. From the standpoint of recreational waters, appearance and clarity are often used by the general public to judge water quality. Soils, vegetation,

geologic formations, reservoir fluctuation, and resource management practices influence the sediment loads and turbidity levels in Prineville Reservoir.

Prineville Reservoir is moderately nutrient rich in phosphorous and nitrogen, which can favor algal blooms. The turbidity of the reservoir limits sunlight penetration, however, which limits photosynthetic activity and reduces the likelihood of algal blooms. Orthophosphate phosphorous was measured at 0.047 mg/l in May 1982, and 0.025 mg/l in July 1982. These levels would usually indicate a eutrophic system, but corresponding chlorophyll A levels are low (an indicator of phytoplankton production), indicating an ultraoligotrophic, or unproductive, system.

High turbidity is the primary water quality problem in Prineville Reservoir and in the Crooked River below Bowman Dam. High turbidity in the reservoir is primarily a result from erosion that occurs along the mainstem Crooked River, Camp Creek, Eagle Creek, and Bear Creek, and from shoreline erosion along the reservoir edge from wind and boat-generated waves. The reservoir shoreline and adjacent and upstream watersheds are dominated by highly erodible soils including montmorillonite clays. Upstream land use practices including logging, road building, and heavy livestock grazing have contributed to erosion in the watershed (OSU 1976). In addition, erosion from uncontrolled recreational use has contributed to sedimentation of the lake and related high levels of turbidity. When washed into the reservoir, the fine montmorillonite clay particles can stay in suspension for several years, increasing turbidity and blocking sunlight penetration in the water column (ODFW 1996).

The temperature cycle of Prineville Reservoir is representative of reservoirs in Oregon. During the spring, the reservoir has a relatively uniform vertical temperature profile. Warming of surface waters combined with wave action cause convective currents and a mixing of surface waters. The upper region of the reservoir is generally uniformly warm, turbulent, and well mixed. The lower region is cold and relatively undisturbed. The thermocline is the point where these two layers meet during the summer and early fall. As surface waters cool through the fall, the reservoir turns over, returning to a uniform temperature profile. The thermocline descends in response to drawdown.

3.3.2 Environmental Consequences

The three alternatives would have the potential to have some effect on surface water and groundwater hydrology where new developments are planned, and there are implications to water quality across the three alternatives. Generally, the primary concern is the disturbance of soil and vegetation from increased or continuing dispersed recreation, off-road vehicle use, and livestock grazing. Increasing the amount of impervious surface would increase surface water runoff without the use of stormwater management measures and has the potential to increase soil erosion and affect water quality. Under all alternatives, it is assumed that siting, design, and construction of new recreation facilities would include the BMPs described in Chapter 5, which include measures to minimize the effects of construction erosion. These measures also include the design and implementation of the appropriate stormwater collection and treatment facilities associated with the addition of impervious surfaces, roads, and new structures. Even with these BMPs, there would likely be some increase in stormwater runoff that would contribute to water quality degradation. Implementation of BMPs would minimize these effects, however. In addition, the trend of increased recreation use on land and on the reservoir is likely to reduce water quality under all alternatives from oil and gasoline spillage from boats, increased soil compaction, and vegetation disturbance from increased recreation use. The effects of the alternatives to water resources are described below.

3.3.2.1 Alternative A – No Action, Continuation of Existing Management Practices

As described above, the reduction of disturbance factors along the reservoir shorelines, wetlands, riparian areas, and other sensitive sites would reduce soil erosion. This in turn would improve water quality of the reservoir. These measures would not substantially improve the water quality of Prineville Reservoir because of the large amount of sediment that enters the reservoir from outside Reclamation lands (OSU 1976).

Implementation of vegetation restoration efforts would improve water quality by reducing and filtering surface water runoff. Reduction of livestock use of wetlands, riparian areas, and areas with cryptobiotic crusts would improve density and quality of vegetation, reduce erosion, and provide subsequent benefits to water quality. Development of a Habitat and Wildlife Management Plan would benefit surface water hydrology and water quality by restoring damaged vegetation and reducing surface water runoff and the resulting sedimentation of the reservoir.

Designating camping sites in the SWA would help retain native vegetation, reduce runoff, and maintain water quality. Under Alternative A uncontrolled camping and recreation use of the Combs Flat area would continue to degrade vegetation and soil, which would negatively affect surface water hydrology and water quality from continued upland and shoreline erosion.

Proposed expansion at the State Park could negatively affect surface water hydrology and water quality if stormwater facilities were not correctly designed. Even with proper stormwater design, it is likely that water quality impacts would not improve at the new or improved boat ramps where vehicle and boat oils, grease, and gasoline would drip onto the ramp or directly into the reservoir during the unloading and loading of boats. This would be an inevitable impact for all alternatives and would increase with increasing recreation use of the reservoir. Design of limited parking for vehicles and trailers and enforcement of no parking zones may provide an upper limit to the number of boaters that can be accommodated at Prineville Reservoir. This may stabilize the introduction of pollutants into the reservoir from recreational boating. Dispersed boat-in use of areas outside of the SWA would continue to affect water quality from the lack of toilet facilities and the ensuing dispersed human waste.

The addition of designated campsites at Roberts Bay East would provide beneficial effects to water quality by reducing soil erosion and sedimentation. Conversely, the continued random recreation use patterns at Juniper Point and Roberts Bay West would continue to adversely affect water quality from erosion and sedimentation. There would be minor adverse effects on groundwater from the development of a potable water source at Roberts Bay East. The Crooked River region is growing and water supply is of continued concern, but the amount of water that would be needed for seasonal use is relatively minor and there are no nearby residential wells.

Mitigation and Residual Impacts [Alternative A]

No mitigation measures are proposed for Alternative A because the actions under this alternative do not have substantial adverse impacts on hydrology or water quality in the RMP study area. BMPs listed in Chapter 5 (Environmental Commitments) are included for all alternatives. The residual impacts are previously discussed in more detail in the above narrative.

Cumulative Impacts [Alternative A]

The continued increase of recreational use of the land and water at Prineville Reservoir will likely increase soil erosion and sedimentation, and increase water quality impacts from increased boat traffic.

3.3.2.2 Alternative B – Natural Resource/Dispersed Recreation Balance

Alternative B would have similar effects to surface and groundwater and to water quality as described under Alternative A, with some minor differences. The increased emphasis on recreation user education regarding the “pack-in and pack-out” garbage policy would reduce adverse effects to water quality by reducing litter and garbage accumulation and subsequent contaminated runoff.

As described above, the increased efforts at vegetation restoration would reduce soil erosion and sedimentation and would aid in improving water quality. Maintenance of existing use patterns at the SWA campsites would continue to adversely affect surface water hydrology and water quality. Continued degradation of vegetation, soil compaction, and random road patterns in the SWA provide sources of erosion that reduce water quality.

Increasing the amount of available boat moorage facilities at Prineville Reservoir Resort would have minor adverse effects on the local water quality from the addition of oil and gas drippings from moored boats. These effects are negligible when compared to the oil and gas contributions from increasing boat use on the reservoir that would likely occur across all alternatives.

Implementing designated campsites at Juniper Point and Roberts Bay would aid in improving surface water hydrology and water quality conditions by reducing soils and vegetation impacts and the resulting impacts to water quality. The higher level of amenities at the State Park area and at Roberts Bay would lead to greater use of groundwater. Because of the distance of the site from residential, municipal, or industrial water users, this would not cause any adverse impact. Depending on the depth of groundwater during a dry year, the amenity level offered may need to be adjusted.

Mitigation and Residual Impacts [Alternative B]

No mitigation measures are proposed for Alternative B because the actions under this alternative do not have substantial adverse impacts on hydrology or water quality in the RMP study area. BMPs listed in Chapter 5 (Environmental Commitments) are included for all alternatives. The residual impacts are previously discussed in more detail in the above narrative.

Cumulative Impacts [Alternative B]

Cumulative impacts under Alternative B would be similar to those described under Alternative A.

3.3.2.3 Alternative C - Natural Resource Protection/Formal Recreation Emphasis

Impacts to hydrology and water quality under Alternative C would be similar to those described under Alternative B, with some exceptions. Under Alternative C, there would be an increase in restoration efforts and protection of cryptobiotic crusts areas, which would further reduce soil erosion and the resulting sedimentation and reduction of water quality. Improved fencing of livestock grazing from shoreline, wetland, and riparian areas would reduce the amount of livestock waste that enters the reservoir and aid maintaining vegetation within these plant associations.

The increased use of designated campsites in the SWA and the elimination of undesignated dispersed camping would reduce vegetation disturbance and the resulting soil erosion and negative effects to water quality. The increased placement of toilet facilities at boat-in sites around the reservoir and the proposed increase in capacity of toilet facilities at the primary camping and day use areas would provide additional protection for water quality of Prineville Reservoir.

The increased use of designated campsites, increased toilet facilities, and formalized setting at Roberts Bay would consolidate use and reduce the recreation sprawl that has damaged vegetation, compacted soils, and increased sediment runoff into the reservoir.

Mitigation and Residual Impacts [Alternative C]

No mitigation measures are proposed for Alternative C because the actions under this alternative do not have substantial adverse impacts on hydrology or water quality in the RMP study area. BMPs listed in Chapter 5 (Environmental Commitments) are included for all alternatives. The residual impacts are previously discussed in more detail in the above narrative.

Cumulative Impacts [Alternative C]

Cumulative impacts under Alternative C would be slightly less than those described under Alternative A because of the increase in formal camping facilities and the increase in number and efficiency of sanitation facilities. Increased recreation use of the reservoir would likely have a corresponding adverse effect on water quality.

3.4 Vegetation

3.4.1 Affected Environment

3.4.1.1 Cover Types

Vegetation communities in the study area were characterized by W&H Pacific (2000). The following major vegetation cover types are found near Prineville Reservoir: (1) woodland communities, (2) shrub communities, (3) herbaceous communities, (4) rock outcrop and talus, (5) developed areas, and (6) wetland communities. The following sections describe the individual plant communities within each of the major groups.

Woodland Communities

Juniper woodland communities occupy 4,674 acres, or 79 percent of Reclamation's land (Table 3.4-1). Most of the forested vegetation cover types near Prineville Reservoir are dominated by western juniper (*Juniperus occidentalis*). Western juniper is the only native tree species near the reservoir except for an occasional ponderosa pine (*Pinus ponderosa*) in sheltered areas. All of the juniper woodland areas are composed primarily of juniper/big sagebrush (*Artemisia tridentata*)/bluebunch wheatgrass (*Pseudoregeria spicata* ssp. *spicata*) but are further divided into communities based on soils, current conditions, and species composition (W&H Pacific 2000).

In addition to big sagebrush, other shrub species associated with juniper woodlands include gray and green rabbitbrush (*Chrysothamnus nauseosus* and *C. viscidiflorus*) and bitterbrush (*Purshia tridentata*). The two rabbitbrush species are most common in disturbed areas while bitterbrush is limited to areas near the County boat ramp.

The juniper-dominated woodlands have varying herbaceous layers depending on the past level of grazing. Stands not heavily grazed are dominated by native bunchgrasses such as bluebunch wheatgrass, Sandberg's bluegrass (*Poa sandbergii*), Thurber's needlegrass (*Stipa thurberiana*), and bottlebrush squirreltail (*Sitanion hystrix*). On north slopes, Idaho fescue (*Festuca idahoensis*) is numerous. More well-drained soils support needle-and-thread grass (*Hesperostipa comata* ssp. *comata*) and Indian ricegrass (*Oryzopsis hymenoides*). Forbs include: Douglas phlox (*Phlox douglasii*), gray groundsel (*Senecio canus*), and locoweed (*Astragalus* spp.). Undisturbed areas support well-developed cryptobiotic crusts. The coverage of non-native cheatgrass increases as the severity of grazing and/or recreational disturbance increases.

Within the study area, juniper reaches a density of 100 trees per acre (Reclamation 2002). Prior to European settlement, juniper was much less prevalent; however, suppression of the natural wildfires has resulted in substantial expansion in juniper coverage. The causes and effects of juniper expansion are variable (Bedell et al. 1993, Belsky 1996). The dense juniper coverage can result in high bare soil coverage and poor sagebrush and grass cover (Reclamation 2002). If not managed, western juniper is expected to substantially increase within the watershed.

Since the 1980s, BLM has conducted juniper removal on lands adjacent to Reclamation lands at Prineville Reservoir, however, no such management has occurred on the Reclamation lands. In some cases,

Table 3.4-1: Acreage of cover types in the Prineville Reservoir study area.

Cover Type	Acres	Percent
Western Juniper Woodlands		
Western juniper/big sagebrush/bluebunch wheatgrass woodland with dense understory	353.4	6.0
Western juniper/big sagebrush/bluebunch wheatgrass woodland with moderate to light understory	2,192.6	37.1
Western juniper/big sagebrush/bluebunch wheatgrass woodland with rock outcrops	61.0	1.0
Western juniper/big sagebrush/bluebunch wheatgrass woodland with stony red clay soils	182.9	3.1
Western juniper/big sagebrush/Thurber's needlegrass-bottlebrush squirreltail woodland with sandier substrate	176.5	3.0
Western juniper/big sagebrush/Thurber's needlegrass-bottlebrush squirreltail woodland with sandier substrate	86.7	1.5
Western juniper/big sagebrush/cheatgrass woodland	367.6	6.2
Western juniper/bluebunch wheatgrass savanna, with dense bunchgrass understory	306.9	5.2
Western juniper/bluebunch wheatgrass savanna, with light bunchgrass understory	778.9	13.2
Western juniper/bluebunch wheatgrass savanna, with light bunchgrass understory on red clay substrate	167.8	2.8
Western Juniper Woodland Total	4,674.3	79.2
Shrub-steppe Communities		
Big sagebrush/bluebunch wheatgrass shrub-steppe	93.0	1.6
Big sagebrush/bluebunch wheatgrass shrub-steppe, with red substrate	18.9	0.3
Big sagebrush/Thurber's needlegrass shrub-steppe	4.1	0.1
Big sagebrush/cheatgrass shrub-steppe, on stony silt-loam substrate	346.5	5.9
Big sagebrush/cheatgrass shrub-steppe, on red clay substrate	19.8	0.3
Shrub-steppe Communities Total	482.4	8.2
Grass-Forb Communities		
Native grass communities	4.3	0.1
Non-native grass/forb communities	87.6	1.5
Grass/Forb Communities Total	91.8	1.6
Rimrock and canyon shrubland, with sagebrush Total	240.8	4.1
Wetland and Riparian Communities		
Shoreline Palustrine Emergent Communities		
Matted muhly-Arctic rush-slenderbeak sedge-Douglas sedge	18.2	0.3
Creeping spike rush-matted muhly-Arctic rush-slenderbeak sedge-Douglas sedge	23.7	0.4
Quackgrass-saltgrass-meadow foxtail alkaline wet meadow	26.2	0.4
Shallow Water/Shoreline Palustrine/Shrub Community		
Water smartweed-Creeping spikerush-American water plantain/Pacific willow-coyote willow/matted muhly-Arctic rush	95.7	1.6
Riparian Shrub/Emergent Marsh Community		
Pacific willow/creeping spikerush/matted muhly	6.1	0.1
Sandbar Shrub Community		
Pacific willow-coyote willow/creeping spikerush-Arctic rush	42.3	0.7
Other Riparian Communities		
Creek riparian willow community	11.1	0.2
Riverine gravel bar community	6.0	0.1
Wetland and Riparian Communities Total	229.3	3.9
Developed/Disturbed Cover Types		
Developed forested areas	73.8	1.3
Developed non-forested areas	19.7	0.3
Proximate disturbed areas	92.7	1.6
Developed/Disturbed Cover Total	186.2	3.2
Grand Total	5,904.8	100.0

Source: W&H Pacific (2000).

Note: The total acreage does not match Reclamation's estimate of the total acreage of their land at Prineville Reservoir (5,460 ac). The vegetation analysis was complete at a less than full pool level and includes habitats such as riverine gravel bar acreage.

juniper removal has been shown to increase herbaceous plant production and decrease bare soil coverage, but this does not always result in an improvement in range condition (Vaitkus and Eddleman 1987).

Shrub Communities

Shrub communities are dominated by big sagebrush and either bluebunch wheatgrass, Thurber's needlegrass, or cheatgrass (*Bromus tectorum*). Together, the shrub communities occupy 482 acres, or 8 percent of the lands near the reservoir (Table 3.4-1). Other herbaceous plant species found in the shrub communities include Sandberg's bluegrass, bottlebrush squirreltail, needle-and-thread grass (*Stipa* spp.), Idaho fescue, yarrow (*Achillea millefolium*), buckwheat (*Eriogonum* spp.), and locoweed.

Herbaceous Communities

Upland communities that lack shrubs and juniper are limited to 92 acres, or less than 2 percent, mostly in sandy openings. These sites are dominated by Thurber's needlegrass and/or bottlebrush squirreltail. As disturbance level increases, the coverage of cheatgrass, Canadian thistle (*Cirsium arvense*), and spotted knapweed (*Centaurea maculosa*) increases. About half of the upland herbaceous communities are dominated by non-native species.

Rock Outcrop and Talus

Rimrock and canyon shrubland dominated by big sagebrush, mountain mahogany (*Cercocarpus* spp.), serviceberry (*Amelanchier alnifolia*), bitterbrush (*Purshia tridentata*), currant (*Ribes* spp.), and rose (*Rosa* spp.) occupy 241 acres (Table 3.4-1). Talus slopes occur below Bowman Dam.

Developed Areas

Developed areas include: (1) developed non-forested areas with buildings, parking lots, landscaped plantings, irrigated grass, paved and unpaved roads and parking pull-offs, and housing developments; (2) developed forest areas associated with developed campgrounds and primitive campsites; and (3) proximate disturbed areas that include the highly disturbed areas adjacent to roads, campsites, boat ramp facilities, and areas impacted by ORV use (W&H Pacific 2000). Combined, these areas cover 186 acres (Table 3.4-1). Although non-native plant species dominate most of the herbaceous vegetation, remnant patches of native vegetation also persist in some areas.

Wetland Communities

Five groups of wetland communities were mapped in the study area: (1) shoreline palustrine emergent communities, (2) shallow water/shoreline palustrine emergent/shrub community, (3) riparian shrub/emergent marsh community, (4) sandbar shrub community, and (5) riparian channels and gravel bars (W&H Pacific 2000). Together, these communities occupy 229 acres, or 4 percent of the study area (Table 3.4-1). The following sections discuss each of these communities.

Shoreline Palustrine Emergent Communities

The shoreline palustrine emergent communities occur below the normal high water line. Shorelines and inlets with gradual slopes support narrow zones of matted muhly (*Muhlenbergia richardsonis*)/arctic rush (*Juncus balticus* var. *balticus*)/slenderbeak sedge (*Carex athrostachya*)/Douglas sedge (*C. douglasii*) emergent marsh. Other areas of the shoreline, particularly near Roberts Bay, Antelope Creek

inlet, Jasper Point boat ramp, Powder House Cove, and Juniper Point inlet, support communities dominated by creeping spikerush (*Leaheies macrostachya*)/matted muhly/arctic rush/slenderbeak sedge/Douglas sedge. These two communities cover 18 and 24 acres, respectively (Table 3.4-1).

A Natural Resources Conservation Service (NRCS) Wetland Conservation Determination conducted in 1999 documented approximately 60 acres of wetland along the reservoir (NRCS 1999). The largest contiguous wetlands are located in the cutoff oxbow near Old Field and along the lower portion of Bear Creek. The drawdown area at Roberts Bay is currently being managed for wetland restoration by prohibiting vehicular traffic off of designated roads. A reconnaissance of the area indicated a mixture of wetland and upland vegetation and a general lack of hydric soils. However, approximately 10 percent of the area likely meets the technical wetland criteria (pers. comm., A. Moore, 2000). These wetlands would be difficult to specifically identify as they are scattered in a mosaic pattern among upland areas. The lowermost portions of the drawdown zone are dominated by the non-native foxtail pricklegrass (*Crypsis alopecuroides* [= *Heleochoa alopecuroides*]). There was evidence of past vehicular traffic creating extensive rutting in the drawdown area.

Shallow Water/Shoreline Palustrine Emergent/Shrub Community

The one community of this type was a water smartweed (*Polygonum amphibium*)/creeping spikerush/American water plantain (*Macaerocarpus californica*)/Pacific willow (*Salix exigua*)/coyote willow/matted muhly/arctic rush. This community is located at the eastern portion of the reservoir near Old Field and occupies 96 acres (Table 3.4-1). Some of this community has been removed by recreational activity (angling and camping) along the river.

Riparian Shrub/Emergent Marsh Community

Areas near the mouth of Owl Creek, Juniper Bass campsite, and upstream on the north shore of the river support plant communities dominated by Pacific willow (*Salix lasiandra*)/creeping spikerush/matted muhly. Approximately 6 acres of this community were mapped in the study area (Table 3.4-1). In some of these areas, the willows extend into the water.

Sandbar Shrub Community

Pacific willow/coyote willow/creeping spikerush/arctic rush shrub community occurs in 42 acres on several sandbars in the riverine section upstream of the reservoir (W&H Pacific 2000). Although willow dominates these areas, recently disturbed areas have many weeds.

Riparian vegetation represents a minor proportion of the overall study area acreage but is critical for biological biomass and species diversity (Reclamation 2002). Riparian habitats are characterized by willow, wheatgrass, alder (*Alnus rhomifolia*), dogwood (*Cornus stolonifera*), and scattered cottonwood (*Populus trichocarpa*) (Reclamation 2002). Riparian vegetation provides shade for water temperature control, hiding cover for fish, and bank stability through root systems. Riparian plants are especially important in holding soils and reducing bank erosion. Several of the streams in the study area are greatly affected by grazing and ORV activity. For example, the Bear Creek channel is incised 2 to 6 feet.

Other Riparian Communities

Creek riparian channels and gravel bars represent 11 and 6 acres, respectively (Table 3.4-1). The former community which is dominated by willow, needle-leaf spikerush (*Eleocharis acicularis*), and creeping spikerush occurs along Eagle, Sanford, Deer, Black Canyon, and Antelope creeks (W&H Pacific 2000). The latter community is limited to areas along the northwest side of Big Bend Recreation Site downstream of Bowman Dam.

3.4.1.2 Vegetation Management

Vegetation management issues at Prineville Reservoir include: (1) control of noxious weeds, (2) revegetation of disturbed areas, and (3) juniper management. The following sections discuss these issues.

Noxious Weeds

Department of Interior (DOI) directives 609 DM 1 (June 26, 1995), Secretarial Order No. 3190 (June 22, 1995), and Reclamation Manual Directive ENV 01-01 require development and approval of programs for the control of undesirable plants on DOI lands. Reclamation has developed a Draft Integrated Pest Management (IPM) Plan for controlling noxious weeds and unwanted non-native plant species (Reclamation 2002). This plan calls for noxious weed control primarily by application of chemical herbicides (pers. comm., B. Pieratt, April 11, 2001). In 1998 Reclamation began contracting with the U.S. Forest Service (USFS) and Crook County to conduct noxious weed management programs. These activities had significant impacts on the perennial pepperweed, spotted knapweed, Russian knapweed, and whitetop populations.

Six noxious weed species recognized as “A” listed by the Oregon Department of Agriculture (ODA) have been documented at Prineville Reservoir (Table 3-4-2). Species that are “A” listed are weeds of known economic importance which occur in the state in small enough infestations to make eradication/containment possible; or are not known to occur, but the presence in neighboring states make future occurrence in Oregon seem imminent (ODA 2001). Intensive control is the recommended action for infestations. Russian knapweed (*Centaurea repens*) is by far the most common of these species. In addition to those species listed in Table 3.4-2, cheatgrass—a very widespread non-native annual grass that dominates disturbed areas and that is almost impossible to control—also occurs on Reclamation land.

Table 3.4-2: Noxious weeds documented at Prineville Reservoir.¹

Species	Acres
Perennial pepperweed (<i>Lepidium latifolium</i>)	20
Russian knapweed	200
Whitetop (<i>Cardaria draba</i>)	20
Canada thistle	75
Puncture vine (<i>Tribulus terrestris</i>)	2
Spotted knapweed	2

Source: Draft Integrated Pest Management Plan for Prineville Reservoir – Crooked River Project – Oregon 2/19/2002.

¹ Species on the Draft Crook County Noxious Weed Control “A” list.

Revegetation of Disturbed Areas

The condition of the native vegetation varies greatly in the study area. Damage to native vegetation is often severe in locations where recreationists drive and camp along the shoreline (BLM 1980a).

There are several BLM grazing allotments that include Reclamation land (see Section 3.9, Land Use). Evidence of grazing was noted near Roberts Bay during a 2000 site visit (compacted and grazed vegetation, cow tracks and scat in wetland).

ORV use on the lands surrounding Prineville Reservoir is a recreational activity that has occurred for more than 20 years. Extensive ORV traffic off of designated roadways has resulted in substantial damage to upland, riparian, and wetland vegetation communities. The relatively open terrain results in many unauthorized “jeep” trails. These trails increase erosion and do not easily revegetate. BLM generally considers areas with slopes >30 percent to be unacceptable for ORV use (BLM 1980b). OPRD, Reclamation, and BLM have been active in closing the unauthorized trails and attempting revegetation in selected areas near the reservoir on Bureau of Reclamation and BLM administered lands.

Juniper Management

Historically, the uplands near the reservoir were dominated by big sagebrush, Idaho fescue, and bluebunch wheatgrass and supported only widely scattered juniper trees. However, during the last 50 years, a pattern of fire suppression and livestock grazing has resulted in a substantial expansion of juniper woodland. A number of publications suggest that juniper encroachment has altered microclimates, water cycles, nutrient cycles, and plant and animal species (Bedell et al. 1993). The effect of junipers on soil, water, and grass and forbs is complex, however. Juniper control has been conducted on private and public land under the premise that it is an invading weed that dries up springs and streams, increases erosion, and reduces biodiversity and forage for wildlife and livestock (Bedell et al. 1993). Scientific evidence to support these claims is lacking (Belsky 1996). BLM documents (BLM 1993) indicate that juniper control would improve capture and storage of water, streamflow, forage and cover for big game, and fish habitat among other natural resources. An Oregon State University (OSU) Extension publication notes that “If not managed, western juniper would come to dominate a majority of eastern Oregon range sites” (Bedell et al. 1993). But this assertion is contradicted by a USFS, BLM, and FWS survey indicating that only 5 percent of eastern Oregon currently is or would potentially be affected by juniper encroachment (ODFW 1993).

There is a lack of data regarding the effects of juniper removal, no longitudinal studies measuring changes in ecosystem properties during succession of grasslands to woodlands, and only a few studies on the effects of juniper removal, often with conflicting results (Belsky 1996). While ranchers and range managers often claim that junipers dry up springs and streams, there is little substantial evidence to support this (Belsky 1996). These popular assumptions ignore the complexities of ecosystem interactions. An example is that in arid climates, most snow/rain water recharges the soil column and leaves little available for downslope movement into drainages (Hibbert 1983; West 1984). Thus, removing juniper often has no effect on stream recharge.

In addition, studies in eastern Oregon note that while herbaceous production can double after juniper removal, much of this increase comes from annual forbs such as fireweed. This study concluded “...an increase in herbage production after tree removal does not necessarily result in an improvement in range condition” (Vaitkus and Eddleman 1987). Purported effects of juniper on water infiltration and erosion

are fewer than the effects caused by livestock, which reduce cover and disturb soil with hooves (Wilcox 1994). And because much of the intermountain west has been significantly affected from grazing impacts, interactions of grazing and juniper encroachment are difficult to separate. Evans (1988) concludes that excessive rates of runoff and sediment in pinyon-juniper woodlands were due to grazing and other human-related activities. Therefore, the effects of juniper control are not clear, often varied, and difficult to separate from grazing impacts. This does not mean that juniper control has no place in vegetation management, but that it should be done judiciously, with clear goals and objectives, and be based on a thorough scientific understanding of the complexities of site-specific conditions.

Currently, there are very few areas that do not have at least some juniper at Prineville Reservoir. The draft Prineville Reservoir IPM Plan (Reclamation 2002) indicates that there are 400 acres of land in the SWA with an 80 percent increase in juniper, but the time period of this increase is not identified. The IPM Plan says this increase "...is currently threatening the viability of the diverse grassland ecosystem." No data are cited for this assertion. BLM has been conducting manual juniper thinning on BLM land near Reclamation land, and BLM states that juniper thinning activities have been effective in stopping erosion and increasing sagebrush and perennial herbaceous vegetation cover (pers. comm., J. Swanson, BLM, 2002).

3.4.2 Environmental Consequences

For all alternatives, the primary potential impact to vegetation is disturbance from developing new facilities and increasing human use, ORV use, and livestock grazing. Actions that increase or do not deter these disturbance factors would cause vegetation loss and damage, increases in weed species distribution, and loss of habitat for wildlife. All of the alternatives and their effects to vegetation in relation to specific disturbance factors are discussed below. A related factor is soil disturbance, as described under Section 3.1. The factors that can adversely affect soil are ones that also cause detrimental effects to vegetation. Consequently, actions that reduce the potential for soil disturbance and erosion also benefit vegetation.

Each of the alternatives has provisions for controlling recreation use, such as designating campsites and reducing or eliminating dispersed camping. While these provisions would reduce impacts from human use, they would not eliminate human-caused impacts to natural resources. There is a general correlation between increasing numbers of outdoor recreationists and impacts to vegetation and wildlife (Ramey 2000). Habitat modification includes disturbance to vegetation, soils, or local microclimate. Trampling of vegetation from people wandering outside defined boundaries is common around campsites (Cole and Landres 1995). Vegetation changes affect local species composition, nutrient uptake of trees, and often lead to invasion of invasive species (Benninger-Traux et al. 1992).

3.4.2.1 Alternative A – No Action: Continuation of Existing Management Practices

Continuance of seasonal road closures in the SWA and development of an improved road signage program would reduce effects to vegetation from using this road during wet weather when drivers tend to expand the width of road by avoiding puddles and ruts. The increased signage would be part of the continued program to enforce the off-road restrictions and educate those using Reclamation lands.

Development and implementation of a Habitat and Wildlife Management Plan as defined under the 1992 RMP would improve vegetation and habitat conditions within the SWA by restoring damaged vegetation, improving weed control, and blocking ORV paths.

There were no specific recommendations regarding juniper management under the 1992 RMP. It is likely that a Habitat and Wildlife Management Plan for the SWA would include provisions for some juniper management, but management of juniper outside the SWA is not part of Alternative A. Therefore, the density of juniper would likely increase under this alternative, which may affect the cover of native grasses and forbs.

Improving fencing and elimination of livestock grazing from shorelines, riparian zones, and wetlands would aid in the recovery of these sites from disturbance. This action also would comply with Presidential Order 11990 directing Federal agencies to minimize adverse effects to wetlands.

In many areas of the reservoir, the primary disturbance factor is not livestock grazing but human disturbance from vehicular use and foot traffic. Continued management of the south shore of the SWA as a boat-in day use area would continue to provide protection for the area's vegetation. In addition, the use of designated campsites in the SWA at Owl Creek, Juniper Bass, Cattle Guard, and Old Field would reduce the current pattern of vegetation disturbance caused by random camping. Informal camping of the Combs Flat area would continue to cause disturbance and removal of native plants and encourage conditions favorable to noxious weeds. Continued unregulated dispersed camping along the north shore of the SWA also would cause adverse effects to vegetation in this area.

Expansion of the State Park Campground and the Antelope Creek Day Use Area would require the removal of about 26 acres of juniper woodland habitat for roads, campsites, and associated facilities. BMPs outlined in Chapter 5 would include the requirement to minimize effects to native vegetation when constructing new facilities. Disturbed areas would be restored with the use of native plants and the implementation of weed control measures.

Improvements at the County boat ramp, as described under the 1992 RMP, are likely to have some construction effects from removal of native vegetation, but the improved traffic flow and parking would likely reduce the disturbance of vegetation outside areas of intended use. The specific ratio of vegetation removed from construction vs. reduced disturbance factors from the improved facility is unknown and difficult to predict. About 7.4 acres of land would be disturbed during construction. The improvement of the boat ramp at Powder House Cove would have similar effects to native plants. About 4.8 acres of land would be disturbed from construction. Improvement of the boat ramp at Prineville Reservoir Resort would not have adverse construction effects to vegetation because of the disturbed nature of the facility and the adjacent land.

Continued dispersed boat-in day use and camping around the reservoir would have adverse effects from human use. This is likely to increase as the number of boats using the reservoir increases. Increasing boating on the reservoir increases the risk that noxious aquatic weeds could be introduced to the reservoir. This threat is somewhat reduced because of the fluctuation of the reservoir water level, which substantially reduces permanent shallow water habitat that most weed species would invade. Maintaining the current use patterns at Juniper Point would have adverse effects to native vegetation by random camping patterns and vehicle use.

About 20 acres of land would be disturbed during improvements at Roberts Bay. A primary concern of all construction activities is the potential for weed infestations from ground-disturbing activity. Implementation of BMPs should minimize this risk. Much of the habitat at Roberts Bay has been disturbed from current recreation use patterns. Implementation of these improvements at Roberts Bay East should reduce these disturbances for the long-term.

Designating campsites at Roberts Bay East would provide a more structured recreation use pattern, which would reduce damage to vegetation from trampling, camping, and vehicle use. Continued blockage of vehicle use of the Roberts Bay wetlands would greatly improve this habitat. In contrast, maintaining the current, unmanaged recreation use at Roberts Bay West would continue to adversely affect native plants.

Mitigation and Residual Impacts [Alternative A]

No mitigation measures are proposed for Alternative A because the actions under this alternative do not have substantial adverse impacts on vegetation in the RMP study area. BMPs listed in Chapter 5 (Environmental Commitments) are included for all alternatives. The residual impacts are previously discussed in more detail in the above narrative.

Cumulative Impacts [Alternative A]

Increased recreation use over the 10-year RMP period would have increasing cumulative effects to vegetation from trampling of vegetation, increased use of informal paths, riparian vegetation impacts, and gathering of firewood. These impacts would be reduced but not eliminated by provisions in Alternative A to control recreation use.

3.4.2.2 Alternative B – Natural Resources/Dispersed Recreation Balance

Impacts from developing new facilities, improving or expanding existing facilities, or continuing current recreation use patterns would be the same as described under Alternative A, where similar actions are proposed.

Under Alternative B, Reclamation would finalize the draft IPM Plan, which if implemented, would benefit native plant associations by reducing noxious weed populations. The IPM Plan includes provisions for management of juniper on Reclamation lands and identifies this as a priority but provides no specific management plan or actions. Under this vague description, it can be assumed that some level of juniper management would occur, but this cannot be quantified at this time. The IPM Plan also would address juniper management with an emphasis on maintaining visual quality. Any juniper management should be conducted with clear goals and a monitoring plan to measure results.

Fencing improvements would reduce disturbance by livestock to sensitive resources such as shorelines, riparian areas, wetlands, and the cryptobiotic soils that occur in the Bear Creek vicinity. Restoration of disturbed habitats would be emphasized in the SWA. This would benefit the vegetation resources of the SWA, but disturbed areas outside the SWA would not improve without intervention. Increased enforcement of the prohibition of ORV use would likely reduce the effects from this activity.

Continuation of existing camping patterns on the north shore of the SWA would lead to ongoing degradation of vegetation and habitat from unrestricted camping, expansion of informal trails and roads, and general disturbance.

Expansion of the State Park Campground and construction of the Antelope Creek Day Use Area would result in the removal of about 13 acres of native juniper woodland and sagebrush habitat. Construction at Powder House Cove would disturb about 7 acres of land, but most of this has been previously disturbed. Some removal of existing vegetation would be required. Roberts Bay improvements would disturb about 23 acres of land, about 3 acres more than under Alternative A. Much of the vegetation

around Roberts Bay has been disturbed from current recreation use patterns. Improvements in the camping and day use patterns should reduce impacts to vegetation in the long-term. Implementation of BMPs during construction would minimize the risk of weed infestations following ground-disturbing activities. Improvements at the Prineville Reservoir Resort are not likely to affect native plants because of the disturbed nature of the site. Improved efforts at weed control would limit the spread of noxious weeds from this disturbed area.

Designating campsites at Juniper Point would reduce the effects of random use patterns of camping, hiking, and vehicle use that lead to vegetation disturbance. With all new designated campsites, increased enforcement would be required to ensure that measures are effective.

Mitigation and Residual Impacts [Alternative B]

No mitigation measures are proposed for Alternative B because the actions under this alternative do not have substantial adverse impacts on vegetation in the RMP study area. BMPs listed in Chapter 5 (Environmental Commitments) are included for all alternatives. The residual impacts are previously discussed in more detail in the above narrative.

Cumulative Impacts [Alternative B]

Cumulative impacts from increased recreation use would be slightly less than those described under Alternative A. While Alternative B provides for more controlled camping on the south shore of the reservoir, dispersed camping would continue in the SWA. Effects from trampling of vegetation outside designated use areas are expected to increase with increased visitor use of Prineville Reservoir.

3.4.2.3 Alternative C – Natural Resource Protection/Formal Recreation Emphasis

In general, benefits to vegetation would be greater than Alternative A or B. Improved education of recreationists would likely reduce the amount of off-road driving that disturbs native vegetation. The longer seasonal closure of the north side road through the SWA would reduce vegetation disturbance during times when the ODFW determines that travel on the road is not desirable to prevent impacts to vegetation and wildlife.

Expansion of habitat management and restoration efforts throughout the entire RMP study area under the Habitat and Wildlife Management Plan would provide beneficial effects to native plant populations. These actions, coupled with improved enforcement of illegal ORV use, would reduce adverse disturbance impacts. Improved fencing would provide additional protection for wetlands and riparian areas. Areas around Antelope Creek and Small Mouth Bay have been identified as priority sites for fencing by FWS.

Coordination of juniper management efforts would provide a more comprehensive management of the species on a landscape level under Alternative C, which would provide beneficial effects for native grass, forb, and shrub species. Measurable goals and a monitoring plan would be developed prior to implementation of juniper control measures.

Designating camping sites in the SWA would reduce disturbance to native vegetation from random camping and vehicle use. Implementation of a program of day use only at Combs Flat would greatly improve this area that currently exhibits a wide array of plant disturbance effects. This measure, combined with increased enforcement and restoration efforts in the SWA, would lead to habitat

improvements for upland and riparian areas. Expansion of the State Park would have similar effects to those described under Alternative B.

The increased amenities proposed for Powder House Cove (9 acres total disturbance) would increase the amount of native vegetation that would need to be removed for the development of these facilities and would contribute to the general loss of habitat. Similar to the effects described under Alternative B, development of formal camping and roads at Roberts Bay would reduce the amount of vegetation disturbance from the uncontrolled pattern of recreation use under current conditions. Vegetation removal at the State Park Expansion Area and Antelope Creek Day Use Area would be about twice that described for Alternative B. Under Alternative C, about 26 acres of land would be disturbed during construction. In addition to the removal of vegetation, cryptobiotic crusts in less disturbed sites would be altered or removed. About 40 acres of land would be disturbed during the construction of facilities at Roberts Bay. This is less of a concern at Roberts Bay, however, because dispersed driving, camping, and day use have severely altered vegetation over much of the area. Over the long-term, the resulting controlled use patterns should promote vegetation recovery for this area. No State-listed plant species, other than those with Federal status discussed in Section 3.6, occur on Reclamation lands.

Mitigation and Residual Impacts [Alternative C]

No mitigation measures are proposed for Alternative C because the actions under this alternative do not have substantial adverse impacts on vegetation in the RMP study area. BMPs listed in Chapter 5 (Environmental Commitments) are included for all alternatives. The residual impacts are previously discussed in more detail in the above narrative.

Cumulative Impacts [Alternative C]

Cumulative impacts from increased recreation visits to Prineville Reservoir would be slightly less than those described under Alternative B because of the increased provisions for designated camping.

3.5 Fish and Wildlife

3.5.1 Affected Environment

3.5.1.1 Fish

A number of fish species have historically occurred in the Lower Crooked River including spring chinook (*Oncorhynchus tshawytscha*), summer steelhead (*O. mykiss*), redband trout (*O. mykiss*), cutthroat trout (*O. clarkii*), and mountain whitefish (*Prosopium williamsoni*). Nongame species included northern pikeminnow (*Ptychocheilus oregonensis*), chiselmouth (*Acrocheilus alutaceus*), longnose (*Rhinichthys cataractae*) and speckled dace (*R. falcatus*), redband shiner (*Richardsonius balteatus*), largescale (*Catostomus macrocheilus*) and bridgelip sucker (*C. columbianus*), and a variety of sculpin (*Cottus* spp.). Introduced hatchery rainbow trout (*O. mykiss*), smallmouth bass (*Micropterus dolomieri*), largemouth bass (*M. salmoides*), brown bullhead (*Ictalurus meles*), and black crappie (*Pomoxis nigromaculatus*) are gamefish present in the reservoir. The Crooked River and Prineville Reservoir are managed by ODFW under the 1996 Crooked River Basin Plan (ODFW 1996).

Essential Fish Habitat (EFH) provisions of the Magnuson-Stevens Act (MSA), the Federal law that governs U.S. marine fish management, require heightened consideration of fish habitat in resource management decisions. EFH is defined in Section 3 of the MSA as “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity.” NOAA (National Oceanic and Atmospheric Administration) Fisheries interprets EFH to include aquatic areas and their associated physical, chemical, and biological properties used by fish that are necessary to support a sustainable fishery and the contribution of the managed species to a healthy ecosystem. The MSA and its implementing regulations at 50 CFR 600.92(j) require that before a Federal agency may authorize, fund, or carry out any action that may adversely affect EFH, it must consult with NOAA Fisheries and, if requested, the appropriate Regional Fishery Management Council. The purpose of consultation is to develop a conservation recommendation that addresses all reasonably foreseeable adverse effects to EFH. EFH applies to anadromous and marine fish. While no anadromous species reach Bowman Dam because of downstream barriers, the Crooked River could be considered potential EFH for anadromous species.

Reservoir

Hatchery rainbow trout are stocked in the reservoir in early to mid-May and are the primary game fish in the reservoir. These hatchery rainbow trout sometimes emigrate from the reservoir into the Crooked River below the dam. High emigration rates appear to correspond with severe drawdown of the reservoir or when the reservoir is high enough that water flows over the spillway (ODFW 1996). Rainbow trout may also migrate upriver during the spring and fall. It is unlikely that these fish are able to reproduce because of the poor habitat conditions in the river.

Several incidences of disease outbreaks have been reported in trout populations in the reservoir. During September 1984, 91 percent of rainbow trout and 96 percent of cutthroat trout from the upper reservoir were infected with *Lernea*, a parasitic copepod. About 68 percent of rainbow trout and 57 percent of cutthroat trout from the lower reservoir were infected. Strawberry disease, a rickettsial or bacterial disease that causes red sores, has been observed over the past 10 years (ODFW 1996).

Largemouth and smallmouth bass were stocked in the reservoir in 1960 and 1961 soon after completion of the project. Natural reproduction has sustained the population since these initial stockings. Largemouth bass are generally found in the upper half of the reservoir while smallmouth bass are common throughout the reservoir. Largemouth bass prefer shallow mudflats, creek mouths, natural coves with stumps, and other underwater structure (ODFW 1996). Winter survival of juvenile largemouth bass is highly dependent on conditions during the summer and early fall. Because weather conditions are variable there is a corresponding variation in juvenile bass survival and later cohort survival and spawning. Abundance of largemouth and smallmouth bass is relatively low compared to other Oregon water bodies (ODFW 1996); the slow growth and general poor condition of largemouth and smallmouth bass in the reservoir indicate an insufficient prey base. FWS has expressed a concern that bass production is likely limited by reservoir drawdowns in the early spring (pers. comm., Rasmussen, 2002).

An abundant brown bullhead population occurs in the reservoir, with an average size of 8 to 10 inches and some examples up to 18 inches. While this species occurs throughout the reservoir, most of the population occurs in the shallow upper end of the reservoir and in the Bear Creek Arm. The population of brown bullhead appears to be overpopulated and stunted (ODFW 1996).

Black crappies were illegally introduced into the Prineville Reservoir in the late 1980s and surveys indicate that they are successfully breeding. Black crappies grow slowly in the reservoir and rarely exceed 8 inches. Over 7,000 black crappies were harvested from the reservoir during 1994. Table 3.5-1 indicates the harvest of gamefish in Prineville Reservoir from April through October 1994.

Table 3.5-1: Estimated harvest of game fish at Prineville Reservoir from April through October 1994.

	Brown Bullhead	Largemouth Bass	Smallmouth Bass	Rainbow Trout	Black Crappie
April	1,038	0	0	3,881	0
May	4,713	20	159	4,701	278
June	6,250	26	53	2,295	868
July	7,371	109	267	1,790	3,553
August	8,258	0	812	1,942	1,248
September	4,475	87	394	2,414	1,221
October	17	0	3	627	16
Total	32,122	242	1,688	17,650	7,184

Source: ODFW 1996.

Nongame species dominate the fish population in Prineville Reservoir. Gillnet sampling indicates that 90-95 percent of the population is nongame species. The numbers of nongame species are likely to exert a major influence on food resources and the viability of game species. Suckers and chiselmouth are the most abundant species, comprising over 70 percent of samples from 1962 through 1980 (ODFW 1996).

Zooplankton densities are relatively low in the reservoir due to the poor phytoplankton production. Zooplankton, which feed upon phytoplankton, are the major food item for juvenile fish, rainbow trout during the spring, and black crappie. Low levels of zooplankton in the reservoir suggest that there is intense competition for limited food by rainbow trout, black crappie, and juvenile bass. As the black crappie population increases, competition for food would likely increase (ODFW 1996). In 2001, ODFW noted a spring die-off of a wide size range of crappie that they attributed to Chronic Wasting Disease or starvation.

ODFW and Reclamation have cooperated on some projects to improve bass habitat in the reservoir, including the placement of about 225 juniper trees in the cove at Sanford Creek and along the shore upstream of the cove. Follow-up electroshock surveys indicated that crappie and bass used the site.

For the past 3 years (1999-2001), ODFW and the Oregon Bass and Panfish Club have cooperated to capture and transport black crappie from Prineville Reservoir to Haystack Reservoir over the Memorial Day weekend. The result has been an average of about 4,000 5- to 8-inch crappie removed from Prineville Reservoir. ODFW monitors fish populations using gill nets in Prineville Reservoir about every 3 to 4 years, mostly to evaluate the trout stocking program. Electrofishing is used to sample the warm water fishery more sporadically (pers. comm., B. Hodgson, 2002).

Downstream Crooked River

The cold water discharge from Bowman Dam has created a tailrace fishery through the Chimney Rock section (to river mile [RM] 57). Summer water temperatures in this section average 47° F to 50° F with a maximum 54° F while winter temperatures average 37° F to 40° F with a minimum of 32° F. Water released from the dam rarely exceeds 54° F (ODFW 1996). Cold water releases maintain good trout populations for a 12-mile reach below the dam to about the Crooked River Feed Canal diversion. Irrigation withdraws and increased water temperatures provide substantially less productive trout habitat from the Crooked River Feed Canal diversion (RM 57) to Highway 97 (RM 18). Because of high turbidity in the reservoir, the Crooked River below the dam is turbid until about RM 18 at Highway 97 where spring inflow contributes clearer water. High volume spill events can cause nitrogen supersaturation downstream of Bowman Dam. In April 1989, 85 percent of rainbow trout sampled between Bowman Dam to Prineville exhibited gas bubble disease. Nitrogen supersaturation below the dam was as high as 109 percent; one month later, saturation levels were still 108 percent at 0.5, 3, and 5 miles below Bowman Dam. ODFW testing and analysis in 1993 concluded that supersaturation was only a problem at flows above 3,000 cfs that extended for long periods. ODFW considers supersaturation below the dam to be an infrequent, localized, and short-term problem (pers. comm., B. Hodgson, 2001).

The Crooked River Chimney Rock section supports a mix of native redband trout, hatchery rainbow trout, and mountain whitefish. Hatchery fish have not been stocked below the dam since 1975, but they emigrate from the reservoir through an unscreened outlet. Small amounts of smallmouth and largemouth bass, brown bullhead, and nongame fish also occur in the river below the dam. Current angling regulations from Bowman Dam to Lake Billy Chinook are a 5 trout per day limit, 6-inch minimum with no more than one fish over 20 inches, with bait and barbed hooks allowed during the regular trout season from late April to the end of October. Since 1988, the lower Crooked River has been open to fishing in winter from November 1 to late April for catch-and-release only with barbless flies and no lures or bait.

Rainbow trout abundance has seen healthy increases since 1989. Abundance was estimated at 826 trout per mile in 1989, 2,289 trout per mile in 1993, 8,228 trout per mile in 1994, and 6,098 trout per mile in 1995. The increase may be a response to increased winter flows from 10 cfs in 1989 to flows from 30 to 75 cfs from 1989 to 1995 (ODFW 1996).

3.5.1.2 Wildlife

When Prineville Reservoir was established, wildlife habitat quality was considered poor due to overgrazing of the region (Reclamation 1992). Gamebird populations were at low to moderate levels and were comprised of a few migrating duck species, California and mountain quail (*Callipepla californica* and *Oreortyx pictus*), and a remnant population of Great Basin Canada Geese (*Branta canadensis*). Duck and geese use Prineville Reservoir as a wintering site. Nongame birds included songbirds, shorebirds, and raptors, many of which still occur along the reservoir. Mule deer (*Odocoileus hemionus*) populations were also small but increased slightly around the reservoir during winter months.

After the reservoir was built, Reclamation entered into an agreement in 1962 with ODFW for management of the upper reservoir area. ODFW manages this area as the Prineville Reservoir SWA. When the reservoir is full, the SWA spans 2,230 acres of terrestrial land and 930 acres of aquatic habitats.

The SWA is managed primarily for waterfowl, upland game, and big game populations (Reclamation 1992). Land management in this area has focused on increasing habitat for these game species. A few species introductions have been carried out under these management goals. Chukar (*Alectoris chukar*) and ring-necked pheasant (*Phasianus colchicus*) have been introduced with limited success due to marginal habitat quantity and quality (Reclamation 1992). Nesting and foraging habitat improvements for game species have been successful, as indicated by population increases for many game species (pers. comm., Ferry, 2001).

Birds

Waterfowl have benefited from the establishment of Prineville Reservoir through an increase in available aquatic habitat (Reclamation 1992). Ducks and geese use the reservoir and SWA for nesting, brooding, and feeding. The upper end of the SWA has become an important nesting area for local waterfowl (pers. comm., Ferry, 2000). Canada goose nesting platforms have been maintained by the ODFW and have led to an increase in nesting populations (Reclamation 1992). Juniper Bass, located along the northern shoreline, has become an important grazing area for geese (pers. comm., Ferry, 2001). Canada goose brood counts performed by ODFW estimated that 69 young were reared on Prineville Reservoir during the 2000 season. Crook County waterfowl surveys estimated over 5,700 birds in the county during the winter of 2001 (pers. comm., Ferry, 2001). Other waterfowl species observed or likely include western grebe (*Aechmophorus occidentalis*), mallard (*Anas platyrhynchos*), northern pintail (*Anas acuta*), American wigeon (*Anas americana*), northern shoveler (*Anas clypeata*), blue-winged teal (*Anas discors*), green-winged teal (*Anas crecca*), cinnamon teal (*Anas cyanoptera*), canvasback (*Aythya valisineria*), redhead (*Aythya americana*), ring-necked duck (*Aythya collaris*), greater scaup (*Aythya marila*), lesser scaup (*Aythya affinis*), common goldeneye (*Bucephala clangula*), bufflehead (*Bucephala albeola*), common merganser (*Mergus merganser*), hooded merganser (*Lophodytes cucullatus*), ruddy duck (*Oxyura jamaicensis*), and American coot (*Fulica americana*).

Shorebirds and wading birds are known to use the RMP study area, especially during migration periods.

Due to concerns over declining shorebirds and available habitat, especially during migration, FWS has recently developed an Intermountain West Regional Shorebird Management Plan (Oring et al. 2001). As throughout the Intermountain West, shorebird migration sites in eastern Oregon are becoming increasingly concentrated and important as habitat is lost or degraded. High quality, freshwater sites are identified in the plan as important and as a declining habitat type utilized by migrating shorebirds in this

region (Oring et al. 2001). Shorebirds and wading birds known or likely to use the RMP study area include great blue heron (*Ardea herodias*), greater sandhill crane (*Grus canadensis tabida*), long-billed curlew (*Numenius americanus*), and killdeer (*Charadrius vociferus*).

Gamebird species are a priority for management in the SWA. Chukar, mourning dove (*Zenaida macroura*), ring-necked pheasant, grouse (order *Galliformes*), and quail (order *Galliformes*) are among the species present in the RMP study area.

California quail (*Callipepla californica*), known locally as valley quail, have been observed in the RMP study area (pers. comm., Soules, 2000). This species uses a variety of habitats including open sagebrush areas (Csuti et al. 1997). It is rarely found farther than 1,200 feet from a water source (Csuti et al. 1997). ODFW reports that California quail are common at the eastern end of Prineville Reservoir, especially in high quality riparian habitats (pers. comm., Ferry, 2001). Current populations of this species appear to be stable compared to 1990 population levels (pers. comm., Ferry, 2001).

Osprey (*Pandion haliaetus*) utilize the reservoir for foraging during the spring and summer (Reclamation 1992). This species is a fish eater and forages in the reservoir and Crooked River. ODFW expects that this species could be nesting in the area but have not confirmed any nest sites. Suitable nesting habitat may occur along the free-flowing sections of the Crooked River, where large trees are located in riparian areas and fish populations are higher.

Golden eagles (*Aquila chrysaetos*) and prairie falcons have been observed nesting around the reservoir (pers. comm., Ferry, 2000). Golden eagles use open habitats for foraging and use cliff ledges for nesting (Csuti et al. 1997). Prey species are mostly small mammals, though eagles are also known to eat larger game animals, birds, and reptiles (Csuti et al. 1997). Golden eagles are granted special protection under the Bald and Golden Eagle Protection Act of 1940 (16 U.S.C. 668-668d, 54 Stat. 250), under which they are protected from persecution and disturbances.

Many other types of birds utilize the RMP study area. The most likely common species include belted kingfisher (*Ceryle alcyon*), downy woodpecker (*Picoides pubescens*), hairy woodpecker (*Picoides villosus*), northern flicker (*Colaptes auratus*), northern shrike (*Lanius excubitor*), Steller's jay (*Cyanocitta stelleri*), western scrub-jay (*Aphelocoma californica*), black-billed magpie (*Pica hudsonia*), tree swallow (*Tachycineta bicolor*), bank swallow (*Riparia riparia*), American crow (*Corvus brachyrhynchos*), common raven (*Corvus corax*), horned lark (*Eremophila alpestris*), red-breasted nuthatch (*Sitta canadensis*), canyon wren (*Catherpes mexicanus*), mountain bluebird (*Sialia sialis*), American robin (*Turdus migratorius*), European starling (*Sturnus vulgaris*), song sparrow (*Melospiza melodia*), white-crowned sparrow (*Zonotrichia leucophrys*), dark-eyed junco (*Junco hyemalis*), red-winged blackbird (*Agelaius phoeniceus*), western meadowlark (*Sturnella neglecta*), Brewer's blackbird (*Euphagus cyanocephalus*), house finch (*Carpodacus mexicanus*), American goldfinch (*Carduelis tristis*), and house sparrow (*Passer domesticus*). Rare songbirds, such as tricolored blackbirds (*Agelaius tricolor*), willow flycatchers (*Empidonax trailii*), and loggerhead shrikes (*Lanius ludovicianus*), as well as woodpeckers (Family: *Picidae*), such as the Lewis's woodpecker (*Melanerpes lewis*), use the habitats of the RMP study area. Ravens also nest in the RMP study area (pers. comm., Ferry, 2001). Tricolored blackbirds are discussed in Section 3.6 due to their conservation status. The remaining rare songbirds are discussed under the rare and sensitive species section below (Section 3.5.1.3).

Migratory Birds

On January 10, 2001, President Bill Clinton signed an Executive Order mandating that all Federal agencies cooperate with the FWS to increase awareness and protection of the nation's migratory bird resources. Each agency is supposed to have developed a Memorandum of Understanding (MOU) with FWS stating how it intends to cooperate. Reclamation has recently finalized an MOU with FWS, which includes provisions for analyzing Reclamation's effect to migratory birds. Most birds in North America are considered migratory under the Federal Migratory Bird Treaty Act. The general bird species of the Prineville RMP study area are described in the above narrative.

Amphibians and Reptiles

Many amphibians and reptiles use the RMP study area, but the presence of these species has not been well documented. Species suspected to occur in the vicinity include the northern sagebrush lizard (*Sceloporus graciosus*) and western toad (*Bufo boreas*), which are discussed in the rare and sensitive species section (Section 3.5.1.3), and the Oregon spotted frog (*Rana pretiosa*), which is treated in Section 3.6 due to its Federal and State status. Common amphibians and reptiles found in the area include gopher snake (*Pituophis catenifer*), common garter snake (*Thamnophis sirtalis*), rattlesnake (*Crotalis viridis*), and fence lizard (*Sceloporus occidentalis*).

Mammals

The RMP study area may provide habitat for a number of bat species: Townsend's big-eared bat (*Corynorhinus townsendi*), small-footed myotis (*Myotis cilolabrum*), long-eared myotis (*Myotis evotis*), and yuma myotis (*Myotis yumanensis*) (FWS 2000a). These species are discussed under rare and sensitive species in Section 3.5.1.3.

Deer population management is a priority for the SWA, especially during winter when deer concentrate in the area. Mule deer are mainly confined to open woodlands and isolated mountain ranges on the east side of the Cascades (Csuti et al. 1997). In the winter, mule deer descend to lower valleys, which are often occupied by human development. In the SWA, winter management includes closing the western end of the North Side Primitive Road from November 15 through April 15, and the eastern end from December 15 through March 15. This staggered road closure was established to allow for recreational access to the eastern end for a longer period and is not optimal for deer management, as this area gets heavy ORV use (pers. comm., Ferry, 2002). Year-round management for deer incorporates maintaining fencing around the entire SWA, which aids in regulating hunting and grazing impacts, and habitat management, such as vegetation restoration and noxious weed control. Neighboring BLM land is managed for deer through juniper thinning, which increases winter forage (pers. comm., Ferry, 2000). The SWA is designated as critical deer winter range by the ODFW, with seasonal use increasing significantly depending on winter severity. Winter mule deer numbers for the SWA have increased from between 50 to 75 animals in the 1960s to between 300 and 500 animals in 1990 (Reclamation 1992). While deer population estimates are not currently estimated for the RMP study area directly, they are kept for the Maury and Ochoco Wildlife Management Units (WMUs), which lie to either side of the SWA. Both WMUs combined held over 24,000 deer in year 2000 (pers. comm., Ferry, 2000). Within the RMP study area, the Bear Creek and Roberts Bay areas are known to be important deer wintering sites that are outside of the SWA (pers. comm., Ferry, 2000). According to SWA biologists, population numbers for deer in the SWA are currently below their general expectations (pers. comm., Ferry, 2000). Deer numbers have increased, but seasonal use patterns remain similar to when the 1992 RMP was

developed (pers. comm., Ferry, 2001). Development of the surrounding area has reduced forage and shelter for resident and migratory deer using the RMP study area (pers. comm., Ferry 2001). Livestock grazing has reduced the value of some mule deer winter habitat on lands outside the SWA (pers. comm., Rasmussen, 2002).

Elk (*Cervus elaphus*) are not a formal ODFW managed species at Prineville Reservoir, but their winter use of the RMP study area has been increasing (pers. comm., Ferry, 2000). It is estimated that 100 to 300 elk use the SWA and adjacent lands, a steady increase since 1990 (pers. comm., Ferry, 2001). ODFW estimates that 6,500 elk use the Ochoco and Maury WMUs outside of the SWA. Prineville SWA herd numbers vary, with regular movement along and between the north and south sides of the reservoir (pers. comm., Ferry, 2001). Cross-reservoir movement does occur, primarily during late fall and winter when the reservoir waters are low (pers. comm., Ferry, 2001). Use of lands around the reservoir decreases during spring and summer months, especially on the north side of the reservoir. Winter habitat use by elk is of primary concern because this is when they concentrate for foraging (Csuti et al. 1997). In addition, there is concern over habitat loss from development and recreation use in the area (pers. comm., Ferry, 2001). In cooperation with the BLM and in reaction to increased use of the SWA by elk, ODFW is in the process of designating the eastern portion of the SWA on both sides of the reservoir as an elk travel corridor and winter range.

Pronghorn antelope (*Antilocapra americana*) have been observed within the RMP study area by ODFW staff (pers. comm., Ferry, 2000). This species uses open to woodland habitats and tends to range within 5 miles of water (Csuti et al. 1997; Ingles 1965). Pronghorn forage includes sagebrush and a variety of grasses (Ingles 1965).

Cougar (*Felis concolor*) have been observed within the area by ODFW staff and others. Cougar reports in the area have increased over the last decade. Over the past 3 years, ODFW has had an increasing number of sighting reports by landowners along the south side of the reservoir, as well as along the north shore between the dam and the State Park Campground (pers. comm., Ferry, 2001). ODFW estimates that between two and eight cougars reside in the RMP study area, depending on season and reproductive status (pers. comm., Ferry, 2001). The cougar population is likely to fluctuate with deer and elk populations, with the largest number using the area in the winter when prey populations peak.

Nongame furbearers observed at Prineville Reservoir include bobcat (*Lynx rufus*), beaver (*Castor canadensis*), mink (*Mustela vison*), and coyote (*Canis latrans*) (Reclamation 1992; pers. comm., Ferry, 2001). These species are more commonly observed in the SWA in recent years than in the 1960s (Reclamation 1992). Additional nongame mammals observed in the RMP study area include badger (*Taxidea taxus*), muskrat (*Ondatra zibethica*), raccoon (*Procyon lotor*), porcupine (*Erethizon dorsatum*), striped and spotted skunk (*Mephitis mephitis* and *Spilogale gracilis*, respectively), weasel (*Mustela* sp.), and river otter (*Lutra canadensis*) (Reclamation 1992; pers. comm., Ferry, 2001). Pygmy rabbit (*Sylvilagus idahoensis*) and Canada lynx (*Lynx canadensis*) are, due to their Federal sensitive status rankings, described in Section 3.6.

3.5.1.3 Rare and Sensitive Species

There are a number of sensitive and rare species that potentially occur in the reservoir area (see Table 3.5-2). Rare and sensitive species include those listed as Federal Species of Concern that also have Oregon State status or that have an Oregon Natural Heritage Program (ONHP) rank of 3 or 4.

Table 3.5-2: Rare and sensitive species occurring or potentially occurring in the Prineville Reservoir vicinity.

Species	FWS ¹	ODFW ²	ONHP ³
Birds (11)			
Mountain bluebird (<i>Sialia mexicana</i>)	--	SV	4
Mountain quail (<i>Oreotyx pictus</i>)	SoC	SU	4
Greater sandhill crane (<i>Grus canadensis tabida</i>)		SV	4
Western burrowing owl (<i>Athene cunicularia hypugea</i>)	SoC	SC	3
Ferruginous hawk (<i>Buteo regalis</i>)	SoC	SC	3
Swainson's hawk (<i>Buteo swainsoni</i>)	--	SV	4
Willow flycatcher (<i>Empidonax traillii adastus</i>)	SoC	SV	4
Long-billed curlew (<i>Numenius americanus</i>)	SoC	SV	4
Lewis's woodpecker (<i>Melanerpes lewis</i>)	SoC	SC	3
Loggerhead shrike (<i>Lanius boreas</i>)	--	SV	4
Amphibians and Reptiles (2)			
Western toad (<i>Bufo boreas</i>)	--	SV	3
Northern sagebrush lizard (<i>Sceloporus glaciosis glaciosus</i>)	SoC	--	4
Mammals (7)			
Townsend's big-eared bat (<i>Corynorhinus townsendii</i>)	SoC	--	3
Small-footed myotis (<i>Myotis ciliolabrum</i>)	SoC	--	3
Long-eared myotis (<i>Myotis evotis</i>)	SoC	SU	4
Yuma Myotis (<i>Myotis yumanensis</i>)	SoC	--	4
Pallid Bat (<i>Antrozous pallidus pallidus</i>)	--	SV	3
Silver-haired Bat (<i>Lasionycteris noctivagans</i>)	SoC	SU	4

Source: FWS 2000a; ODFW 2000; ONHP 2001.

Footnotes:

¹ FWS Classification: SoC= Federal species of concern.

² ODFW Status: E= endangered; T= threatened; SC= Sensitive Critical- species for which listing as threatened or endangered is not imminent and can be avoided through protective measures; SP/R= Sensitive Peripheral/Rare- species that are on the edge of their range or that are naturally rare; SU= Sensitive Undetermined- species for which status is unclear; SV= Sensitive Vulnerable- species not believed to be threatened or endangered and listing as such can be avoided by continued or expanded protective measures.

³ ONHP Status: 1= taxa that are threatened with extinction or presumed to be extinct throughout their entire range; 2= taxa that are threatened with extirpation or presumed to be extirpated in the state of Oregon; 3= List 3- taxa for which more information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout their range; 4= List 4- taxa which are of conservation concern but are not currently threatened or endangered.

Birds

Mountain bluebird (*Sialia mexicana*) is a species of open forests and woodlands. They are found in coniferous juniper woodlands, as well as along meadow edges, clearcuts, and recently burned areas in higher elevations (Csuti et al. 1997). This cavity-nesting species eats mostly insects and covers territories between 5 to 15 acres around nest sites (Csuti et al. 1997). Though there is a mix of estimates for this species across different regions and habitats, they are thought to be increasing in Oregon (Sauer et al. 2001). This species has been observed in the Bear Creek drainage and in the SWA (pers. comm., Jennifer Seavey, Wildlife Biologist, EDAW Inc. October 17, 2000).

Mountain quail (*Oreotyx pictus*) are generally found in open woodlands at high elevations (Csuti et al. 1997). This species has shown a decline in Oregon, especially in the eastern mountains (Csuti et al.

1997). Mountain quail are known to be present in the RMP study area, though the population status of this rare species at Prineville Reservoir is not well known (pers. comm., Ferry, 2001). This species has been sighted along Sanford Creek on the south side of Prineville Reservoir (pers. comm., Ferry, 2001). Owl Creek has been identified as potential habitat for this species. (pers. comm., Ferry, 2001). It is possible that the elevation range of mountain quail extends low enough to utilize the shoreline of the reservoir (pers. comm., Ferry, 2001). ODFW estimates that mountain quail are likely found in low number on both sides of the reservoir (pers. comm., Ferry, 2001).

Sandhill cranes are thought to have declined by over 3 percent from 1966 to 1999 in Oregon (Sauer et al. 2001). This species breeds in wet meadows and drier grasslands throughout central and southeastern Oregon (Csuti et al. 1997; Gough et al. 1998). However, the species does not breed in agricultural lands in Oregon (FWS 2000b). Nesting territories in Oregon range from 3 to 168 acres (Csuti et al. 1997). Although adequate habitat may exist, this species is not known to breed in the Prineville area.

The range for the western burrowing owl (*Athene cunicularia hypugea*) encompasses the RMP study area (Csuti et al. 1997). Burrowing owls are dependent on burrowing mammals, such as ground squirrels, for their nest sites. Many populations of these burrowing mammals are known to be declining (Partners in Flight, in press). Habitat preferences include areas of open grasslands and shrub-steppe habitat (Dechant et al. 1999a). Studies in north-central Oregon show that, while this species utilizes observation perches in habitats where vegetation is over 5 cm tall, it did not use habitats dominated by rabbitbrush (*Crysothamnus nauseosus*) or bunchgrass (Green and Anthony 1989 as cited in Dechant et al. 1999a). This species has been documented on the Crooked River National Grasslands, northwest of the town of Prineville (Marshall et al. 1996). There are no ONHP records for this species within the RMP study area.

Ferruginous hawks (*Buteo regalis*) potentially occur within the RMP study area, as their range overlaps with Prineville Reservoir (Csuti et al. 1997). However, there are no ONHP records for this species in the area. This species is known to be sensitive to prey abundance declines and nest site disturbances (Dechant et al. 1999b). The shrub-steppe and open juniper woodlands surrounding the reservoir offer suitable habitat for this species (Csuti et al. 1997). Generally, quality habitat consists of minimally grazed prairie or sagebrush shrublands with nesting shrubs and trees at least 1 meter high (Gilmer and Stewart 1983; Partners in Flight in press). Sagebrush has been highlighted by the Partners in Flight Landbird Conservation Plan as target habitat for the ferruginous hawk (Partners in Flight, in press).

According to the ONHP database, Swainson's hawks (*Buteo swainsoni*) may utilize the RMP study area. The occurrence of this species in the area has been confirmed by ODFW (pers. comm., Ferry, 2001). This species is closely associated with riparian systems in arid regions (Schlorff and Bloom 1984). Habitat management for this species includes providing open grasslands with tree patches for nesting and perching that are near cultivated areas (Dechant et al. 2001a). Prey species include insects and small mammals (Dechant et al. 2001a).

Long-billed curlew (*Numenius americanus*) may potentially occur in the RMP study area, but Prineville Reservoir is on the edge of the range of this species (Dechant et al. 2001b). They breed in open grasslands and meadows, often with interspersed shrubs (Csuti et al. 1997). This species forages on insects and vegetation in grasslands and agricultural areas (Csuti et al. 1997).

Willow flycatchers (*Empidonax traillii adastus*) are fairly abundant in willows at the edge of wetlands and riparian areas (Csuti et al. 1997). Habitat requirements of this species in eastern Oregon are dense

shrubby riparian areas interspersed with open areas (Partners in Flight, in press). This habitat exists at the upper end of the SWA, where Pacific willow (*Salix lucida* var. *caudata*) dominates the riparian area (W&H Pacific 2000).

Lewis's woodpeckers (*Melanerpes lewis*) are commonly found in oak and ponderosa pine woodlands (Csuti et al. 1997; Galen 1989). The RMP study area does not contain oak or pine woodlands, and published distribution maps show that this species does not occur in the Prineville area (W&H Pacific 2000, Csuti et al. 1997). However, this species is thought to breed in scattered locations in central Oregon (Marshall et al. 1996) and is occasionally observed around Prineville Reservoir (pers. comm., Ferry 2001). Therefore, it is uncertain if this species is breeding in the area or just foraging. This woodpecker species is very erratic and moves as forage opportunities change (Paige 1999a). Prey species consist of flying insects, fruits, and seeds (Paige 1999a).

Loggerhead shrikes (*Lanius ludovicianus*) are found throughout the late-seral sagebrush community, as large sagebrush is among its preferred nesting habitat (Poole 1992); it also nests in juniper habitat (Bartgis 1992). Both these habitats are available in the Prineville Reservoir area (W&H Pacific 2000). This shrike is known to be present year round in the RMP study area (pers. comm., Ferry 2001). Loggerhead shrike prey species can include insects, reptiles, amphibians, and small birds (Dechant et al. 1998).

Amphibians and Reptiles

The western toad (*Bufo boreas*) is a State-listed vulnerable species and a conservation concern species listed with the ONHP. The habitat requirements are broad for this species and include deserts, chaparral, grasslands, and woodlands (Csuti et al. 1997). This species has been disappearing in many areas for reasons not yet determined (Csuti et al. 1997). This species was observed in 1995 along Sanford Creek, a tributary to Prineville Reservoir (ONHP 2001). This was a breeding observation with one adult and one egg mass observed (ONHP 2001).

One reptile species of concern, the northern sagebrush lizard (*Sceloporus graciosus graciosus*), potentially occurs in the Prineville Reservoir area. This lizard is common in sagebrush habitat and juniper woodlands, such as those that surround the reservoir (Csuti et al. 1997). Therefore, although the presence of this species at Prineville Reservoir is currently unknown, they probably occur due to the presence of available habitat. This species is sensitive to the presence of western fence lizards and are not found where fence lizards have established populations (Storm and Leonard 1995). Sagebrush lizards are very wary, thus difficult to observe, so it is possible that this species occurs in areas around Prineville Reservoir where fence lizards are absent.

Mammals

The Townsend's big-eared bat (*Corynorhinus townsendi*), small-footed myotis (*Myotis cilolabrum*), long-eared myotis (*Myotis evotis*), yuma myotis (*Myotis yumanensis*), pallid bat (*Antrozous pallidus pallidus*), and silver-haired bat (*Lasionycteris noctivagans*) are all species of concern that may be found in the RMP study area. Based on published distribution accounts, the long-eared myotis, small-footed myotis, and pallid bat are the three most likely bats to occur near Prineville Reservoir (Csuti et al. 1997).

All of the above listed bats were observed near the Pelton Round Butte Hydroelectric Project northwest of Prineville (Perkins 1998). In addition, there are bat populations at Chimney Rock along the Crooked

River below Prineville Reservoir (pers. comm., Soules, 2000). Based on the regional observances of these species, it is likely that they occur around Prineville Reservoir.

3.5.2 Environmental Consequences

Wildlife may be affected from actions under all of the alternatives. These effects can be placed in two major categories – effects to habitat and disturbance to wildlife. Habitat effects include a wide array of activities that can cause vegetation removal from construction or off-road vehicle use, vegetation damage, soil compaction by humans, vehicles, or livestock, and overgrazing from livestock. Degradation or loss of vegetation would have a corresponding effect to wildlife that rely on this habitat for different functions, such as food or cover.

Disturbance effects may include any recreation activity that results in changes to wildlife behavior. An example would be increased human use of vehicle traffic in wintering big game habitat that would cause deer and elk to avoid preferred habitat and expend valuable energy during a critical life stage. Ultimately, this could lead to reduced vigor and affect deer and elk mortality and productivity. Development of new facilities and human interactions with wildlife often combine effects for a number of actions under the alternatives. The implications of actions under each alternative to wildlife are discussed below.

3.5.2.1 Alternative A - No Action: Continuation of Existing Management Practices

The limitations on vehicle access under Alternative A would reduce fish and wildlife impacts, although to a lesser degree than the Action Alternatives. In addition, Alternative A could potentially allow for new private access roads across the SWA and Reclamation lands. This would increase disturbances to wildlife, increase ORV use enforcement problems, and reduce the SWA's ability to function as a refuge for wintering deer, elk, and other wildlife. Seasonal closures on the North Side Primitive Road would continue under the existing parameters.

Habitat quality improvements due to Alternative A's sanitation actions would be the most limited compared to Alternatives B and C. Areas of heavy recreational use could experience habitat degradation, especially near such popular sites a Roberts Bay and Juniper Point, which are areas used by deer and elk.

Habitat and wildlife management across the entire study area under Alternative A would incorporate the development of a Habitat and Wildlife Management Plan. While ODFW has not developed a plan, they have developed some primary objectives that would be used to develop a plan (Appendix E). The emphasis of these objectives include:

- Protect and maintain mule deer winter range.
- Protect and enhance riparian vegetation for wildlife.
- Improve waterfowl nesting habitat
- Protect and enhance nesting and wintering habitat for threatened, endangered, and sensitive species.
- Improve quality and quantity of wetland habitat.

- Protect and enhance non-game wildlife habitat.
- Maintain and enhance native vegetation.
- Promote opportunities for wildlife viewing/enjoyment.
- Promote wildlife ethic and stewardship values.

Actions under this plan would focus on the SWA; however, they would extend when appropriate to the entire RMP study area. The development of this plan would benefit wildlife and habitats, especially those with specific management strategies outlined in the plan. The plan would be developed by ODFW in coordination with Reclamation, BLM, and OPRD. Implementation of the plan would provide for a variety of benefits to natural resources in the SWA.

Fisheries would be enhanced under Alternative A, primarily through the development of a Fisheries Management Plan. While there is a general ODFW Crooked River Basin Plan (1996) for fisheries management, there is not a specific fish/aquatic habitat management plan for Prineville Reservoir. Development of such a plan under Alternative A would provide for a consistent strategy and implementation process for fisheries management. The implementation of Alternative A would benefit EFH by development and implementation of a Fisheries Management Plan.

Fencing would be improved under Alternative A to limit livestock use of wetland, riparian, and shoreline habitats. This would be beneficial for both wildlife and habitats, evidence for which is presented below.

Livestock grazing under Alternative A would be eliminated in recreation areas, wetlands, riparian areas, and shorelines. These actions would reduce grazing impacts to sensitive habitats. It has been well established in the scientific literature that changes to the natural disturbance regime can have dramatic influences on native wildlife and habitat (Tilman 1996). Livestock grazing represents a change in the natural grazing regime that historically consisted of periodic grazing by widespread ungulate species (Milchunas et al. 1989). The scientific literature describes that livestock have negative impacts on native plant viability, cryptobiotic soil crusts, riparian corridors, mycorrhizae persistence, soil nitrogen, fire regimes, and weed invasions (Fleischner 1994; Belsky and Gelbard 2000; Belsky 1996). Recently, evidence has been published that grazing encourages the spread of Russian knapweed, the most common noxious weed in Crook County (Lejeune and Seastedt 2001) and other invasive plant species (Belsky 1996; Belsky and Gelbard 2000). In addition, grazing has been attributed with the expansion of juniper woodlands (Bedell et al. 1993). Changes in vegetation that come about through grazing are a result of contribution to the increase in nitrogen in the soil and soil disturbance. These changes in the soil allow exotic species to invade (Belsky and Gelbard 2000; Lejeune and Seastedt 2001), and limiting grazing on sensitive lands is an important step in maintaining healthy soils (Lejeune and Seastedt 2001). In addition, reducing grazing would decrease erosion and increase water infiltration on sensitive lands (Wilcox 1994). This is especially critical in riparian and wetland areas where water quality and flow are important to associated wildlife species, such as the SWA. Considering the importance of riparian habitats in arid ecosystems, livestock exclusion from these sensitive areas would be greatly beneficial (Belsky 1996).

SWA actions under Alternative A would continue the current management of the southern shoreline of Prineville Reservoir, from Roberts Bay to Long Hollow Creek, as boat-in day-use only. This would continue to minimize recreation impacts along this shoreline. These would have beneficial effects on

flora and fauna that use this area. Dispersed camping would continue to be allowed along the northern shoreline of the SWA, which would cause negative impacts on shoreline and riparian habitats from disturbance of vegetation and soil compaction.

Formalizing recreation sites under Alternative A would have generally positive effects with respect to wildlife and habitats; designating campsites is preferential over dispersed camping. Although human disturbances would still remain with designated campsites, the impacts would be more focused and contained with designated campsites. Maintaining use of the north shore for dispersed camping would continue the adverse effects to vegetation and wildlife habitat from trampling and vegetation loss. For instance, the existing camping at the confluence of the reservoir and Owl Creek would likely continue without some control. Mountain quail, a species of reported decline in eastern Oregon (Csuti et al. 1997), are suspected to occur in this area and may be impacted by recreational activity. Many species, like willow flycatcher and California quail, use the willow-dominated riparian habitats in the upper, north shore of the reservoir; dispersed camping along the northern shoreline could also impact these species. Designating campsite perimeters at Owl Creek, Juniper Bass, Cattle Guard, and Old Field would reduce some impacts of random recreation use, but undefined camping at Combs Flat would continue to affect upland, riparian, and shoreline habitat. Increased boating activity under all Alternatives may increase shoreline erosion, but this would be a relatively minor impact (see Section 3.2, Soils).

Expanding the State Park Campground and developing the Antelope Creek Day Use Area would remove about 25 acres of upland juniper and shrub-steppe habitat used by a variety of wildlife species. Continued loss of vegetation in the region outside of protected areas is the primary reason why much of Reclamation land at Prineville Reservoir has been classified as critical deer winter range. Removal of habitat, though minimized through BMPs, would reduce upland habitat and forage for wildlife. Migratory birds would benefit from all actions that reduce impacts to upland, wetland, and riparian habitat.

Improvements to the County boat ramp and the boat ramp at the Prineville Reservoir Resort would not affect vegetation or wildlife. Improvements of the Powder House Cove boat ramp would likely include the removal of some upland vegetation, which would be offset from the benefits of a more controlled parking facility. The BMPs listed in Chapter 5 include provisions for construction timing of boat ramps for the protection of aquatic resources. Maintaining the existing use patterns at Bear Creek would continue to provide benefits to the riparian corridor and wildlife that use this more remote part of Prineville Reservoir. Maintenance of existing camping and vehicle use at Juniper Point and Roberts Bay West would continue to degrade habitat and adversely affect wildlife. Formalizing recreation sites at Roberts Bay East would greatly reduce the effects of recreation-related disturbance factors to vegetation and wildlife. Construction would disturb about 20 acres of land at Roberts Bay. Most of this is disturbed from current recreation use patterns.

Mitigation and Residual Impacts [Alternative A]

No mitigation measures are proposed for Alternative A because the actions under this alternative do not have substantial adverse impacts on fish and wildlife in the RMP study area. BMPs listed in Chapter 5 (Environmental Commitments) are included for all alternatives. The residual impacts are previously discussed in more detail in the above narrative.

Cumulative Impacts [Alternative A]

The continued regional population growth and expected increases in recreation use of Prineville Reservoir would have adverse effects to vegetation from disturbance and trampling of vegetation, with corresponding effects on wildlife. While the formalization of campsites and efforts to control unauthorized use of Reclamation lands would reduce these impacts, cumulative adverse effects to vegetation and wildlife from increasing dispersed recreation use would not be eliminated.

3.5.2.2 Alternative B: Natural Resource/Dispersed Recreation Balance

Effects to wildlife from Alternative B would be similar to Alternative A, except where noted. Sanitation actions would be increased at heavily used recreation areas, which would improve habitat quality at recreational sites.

Habitat and wildlife management under Alternative B would be similar to Alternative A and may benefit wildlife species and their habitats. In addition, Alternative B includes finalizing the IPM Plan, which would provide for more comprehensive weed control that would benefit wildlife habitat.

Fisheries management under Alternative B would benefit fish populations through cooperative enhancement project actions undertaken with ODFW and other partners, but Alternative B does not include the provision of developing a Fisheries Management Plan for Prineville Reservoir, as included in both Alternatives A and C; the lack of such a plan would provide lesser benefits to fish and EFH than those provided by Alternatives A and C. Fish monitoring in the reservoir would be conducted at periodic intervals, which should provide useful management information for ODFW. Habitat enhancement projects would also benefit EFH.

Fencing would be improved under Alternative B and would enhance wildlife passage and resource conflicts as funding allows. This would be beneficial for wildlife, as fencing impedes habitat connectivity for many species, especially large and medium sized mammals. These actions would further reduce habitat impacts caused by livestock grazing and ORV use. Livestock grazing effects would be the same as described under Alternative A.

Under Alternative B, enhancement and restoration efforts in the SWA would continue on an ad hoc basis without the benefit of a comprehensive management plan. While periodic management actions in the SWA would provide benefits to habitat and wildlife, these resources would be better served with a management plan with clear objectives, goals, actions, and monitoring efforts. Continued dispersed camping on the north shore of the SWA would continue to adversely affect vegetation from trampling and general disturbance, with corresponding adverse effects to wildlife that use these habitats. Benefits to migratory birds would be less than those described under Alternative A.

About 13 acres of native vegetation would be removed for the State Park Expansion Area and the Antelope Creek Day Use Area. This is about half the disturbance area of either Alternative A or C. Removal of this vegetation would have a corresponding effect to wildlife such as songbirds, small mammals, and wintering deer. Construction of facilities at Roberts Bay would have minimal effects because of the current disturbed nature of the habitat.

Compared to Alternative A, which designates campsites in the SWA (except Combs Flat), Alternative B would continue the current uncontrolled use patterns, which would continue to degrade upland and riparian habitat and adversely affect fish and wildlife. Impacts from improvements to the north shore

recreation facilities under Alternative B would be the same as those described under Alternative A. On the south shore of the Reservoir more formal recreation facilities at Juniper Point, Roberts Bay East and Roberts Bay West would reduce the current level of habitat disturbance from uncontrolled camping and vehicle use.

Mitigation and Residual Impacts [Alternative B]

No mitigation measures are proposed for Alternative B because the actions under this alternative do not have substantial adverse impacts on fish and wildlife in the RMP study area. BMPs listed in Chapter 5 (Environmental Commitments) are included for all alternatives. The residual impacts are previously discussed in more detail in the above narrative.

Cumulative Impacts [Alternative B]

Cumulative impacts from Alternative B would be slightly less than those described under Alternative A. Formal campgrounds on the south shore would reduce effects of increased visitors while continued dispersed camping in the SWA would affect habitat and disturb wildlife. Dispersed recreation impacts would continue to increase in the SWA, however.

3.5.2.3 Alternative C: Natural Resource Protection/Formal Recreation Emphasis (Preferred Alternative)

Alternative C would provide for all the benefits of vehicle access limitations of Alternatives A and B. In addition, public awareness improvements and limitations on new road development would further reduce ORV impacts. Alternative C provides for actions that would likely result in the greatest reductions in ORV use.

Sanitation actions under Alternative C would improve habitat quality around recreational areas, including water-based activities. Water quality would benefit under this alternative, especially improving conditions for wetland and aquatic species. The implementation of Alternative C would benefit EFH by development and implementation of a Fisheries Management Plan with associated aquatic habitat enhancement projects and periodic monitoring of fish populations.

Alternative C would provide the greatest benefits for prairie falcons and golden eagles at the reservoir among the alternatives. Monitoring efforts under Alternative C would target golden eagle and prairie falcon nest sites and would provide benefits to these species from data collection efforts and would assist adaptive and proactive management. This monitoring plan would be developed in coordination with ODFW and BLM. Development of a Habitat and Wildlife Management Plan for the entire RMP study area would include components for raptors.

Habitat and wildlife management actions and their effects would be similar to those under Alternative B, with the added benefit of additional coordination on vegetation management with BLM and Crook County. Fisheries management actions proposed under Alternative C offer benefits similar to those described under Alternative A.

Fire prevention and pre-suppression would receive more focus under Alternative C than under other alternatives. Cooperation with local counties and BLM would address fire management and planning. In addition, fire prevention information would be posted at recreation sites.

Fencing actions under Alternative C would have the most positive impacts with regard to limiting livestock, ORV, and other activity impacts to wildlife and associated habitats. Wildlife passage design would enhance connectivity of habitat for wild ungulate species.

Alternative C would provide greater benefits to natural resources from a more thorough management of grazing compared to the other alternatives. Specific areas are recommended for eliminating livestock use that would benefit sensitive habitats including wetlands, riparian, and recreation areas. Cryptobiotic crusts would be more precisely mapped and managed. Native species viability, cryptobiotic soils, and native wildlife habitat have all been shown to be negatively affected by livestock grazing (Belsky and Gelbard 2000). Migratory birds would realize the greatest benefit under Alternative C resulting from reductions in human disturbance and increased habitat programs.

SWA management actions would be similar to those described under Alternative A, with an increased emphasis on restoration of areas disturbed by ORV use. A number of actions under Alternative C would reduce the amount of disturbance to vegetation from random patterns of recreation use. Dispersed camping has greater impacts than designated campsites, as dispersed sites are more spread over the landscape and cause more widespread disturbances (Cole and Knight 1991). Dispersed camping has been shown to cause negative impacts on vegetation and wildlife (Knight and Gutzwiller 1995). Camping is among the recreational uses that can impact wildlife habitat through tree damage and loss (McEwen et al. 1996), ground cover vegetation loss (Leung and Marion 2000), tree root exposure (Boyers et al. 2000), soil exposure (Cole 1986), and reduced woody debris (Boyers et al. 2000).

Camping in the SWA would be limited to designated sites only; no dispersed camping would be allowed. This would greatly reduce impacts to vegetation and wildlife from uncontrolled use in the SWA. Combs Flat would become a day use area under Alternative C, which has been heavily disturbed from current recreation use patterns. Restoration efforts in the SWA would have a better chance of success with this scenario of designated campsites.

Alternative C would have the greatest impact among the alternatives to vegetation and wildlife on the north shore of the reservoir. About 26 acres of native habitat would be removed from the State Park Expansion Area and construction of the Antelope Creek Day Use Area. Removal of this habitat and the use of the area by humans would have detrimental effects to songbirds, small mammals, wintering deer, and other wildlife that use this habitat.

Impacts from recreation development on the south shore would be similar to Alternative B, with some exceptions. The increased development at Powder House Cove would eliminate additional juniper woodland and shrub-steppe habitat, which would adversely affect wildlife that use these habitats. The increased level of development under Alternative C at Roberts Bay would formalize campsites and reduce the adverse effects of dispersed camping and driving under the present conditions. If winter use of Roberts Bay is increased because of the addition of cabins and other amenities, there may be additional disturbance to wintering deer.

Mitigation and Residual Impacts [Alternative C]

No mitigation measures are proposed for Alternative C because the actions under this alternative do not have substantial adverse impacts on fish and wildlife in the RMP study area. BMPs listed in Chapter 5 (Environmental Commitments) are included for all alternatives. The residual impacts are previously discussed in more detail in the above narrative.

Cumulative Impacts [Alternative C]

Cumulative impacts associated with Alternative C would be slightly less than those described under Alternative B because of the increased provisions for formal, designated campsites. These provisions would reduce but not eliminate impacts from increased recreation use.

3.6 Threatened, Endangered, and Sensitive (TES) Species

3.6.1 Affected Environment

There are several species of flora and fauna with Federal status designations occurring or potentially occurring within the region surrounding Prineville Reservoir (Table 3.6-1). Special status species included in this review are Federally endangered, threatened, candidate species, and those species with an Oregon Natural Heritage Program (ONHP) ranking of 1 or 2. While candidate species are not protected under the ESA, Reclamation assumes candidate species may be listed at a later date and manages them as if they were listed under the ESA. Species presence data from State and Federal sources, such as FWS, Reclamation, ODFW, ONHP, and OPRD, have been reviewed. A total of 12 TES species (eight wildlife, one fish, and three plant species) are known or likely to occur within the Prineville Reservoir area. Federal protection is afforded to those species listed or proposed as threatened or endangered by FWS under the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884). ESA-related correspondence is included in Appendix F.

3.6.1.1 Wildlife

Of the eight wildlife species, two are Federally listed as Threatened or Endangered (the bald eagle and Canada lynx); one species is a Federal Candidate species (Oregon spotted frog); one is state endangered, and the remaining species are Species of Concern (Table 3.6-1). Federal status, ONHP rank, and Oregon State status are presented in Table 3.6-1. ONHP ranks of 1 or 2 indicate that a species is threatened with extinction either throughout its entire range (rank 1) or within the state of Oregon only (rank 2). Candidate and Species of Concern with 1 and 2 ONHP rankings are included in this section due to the possibility of Federal listing of these species in the near future. Information on these species is presented below.

The lynx, a Federally threatened species, is not likely to reside in the area due to a lack of appropriate boreal forest habitat. However, it may utilize the RMP study area as corridor habitat for travel between more appropriate habitats (pers. comm., Ferry, 2000). Habitat for this species in the Pacific Northwest is generally restricted to higher elevations of the Cascade Range (Koehler and Aubry 1994). Lynx require a mixture of forest types: early successional forest for foraging and late successional forest for dwelling. FWS has concluded that a self-sustaining resident population does not exist in Oregon but that individual animals are present (63 Federal Register [FR] 36994-37013, July 8, 1998). Though recently rediscovered in the Northern Cascades of Oregon, the lynx is naturally a rare species in Oregon as this region is the southern extent of its distribution (Csuti et al. 1997; Roach 1999).

The ONHP database includes one observation of the Oregon spotted frog (1977) in Bear Creek, which is located at the southern tip of Prineville Reservoir (ONHP 2001). It is possible that this species does occur on other portions of Reclamation land at Prineville Reservoir, however. This species requires cool, permanent, quiet water, such as a spring, pond, lake, or slow stream with abundant associated vegetation and a bottom layer of decaying vegetation (Corkran and Thoms 1996; Leonard et al. 1993; Csuti et al. 1997). Spotted frogs do not occupy ponds with bullfrogs (*Rana catesbeiana*) or predatory fish, such as bass (*Micropterus* spp.) (Corkran and Thoms 1996). The presence of bass in Prineville Reservoir, especially near the mouths of tributaries (Reclamation 1992), would preclude the occurrence of spotted frogs in the reservoir itself; however, the frogs could exist farther up tributary creeks.

Table 3.6-1: Threatened, endangered, and sensitive species that are known to or potentially occur in the Prineville Reservoir vicinity.

Species	FWS ¹	ODFW ²	ONHP ³
Amphibians (1)			
Oregon spotted frog (<i>Rana pretiosa</i>) ⁴	C	SC	3
Birds (4)			
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	T	T	1
Tricolored Blackbird (<i>Agelaius tricolor</i>)	SoC	SP/R	2
Greater Sage Grouse (<i>Centrocercus urophasianus</i>)	SoC	--	2
Peregrine falcon (<i>Falco peregrinus anatum</i>)	--	E	1
Mammals (3)			
Canada Lynx (<i>Felis lynx Canadensis</i>)	T	--	2
Pygmy Rabbit (<i>Brachylagus idahoensis</i>)	SoC	SV	2
Spotted Bat (<i>Euderma maculatum</i>)	SoC	--	2
Fish (1)			
Interior Redband Trout (<i>Oncorhynchus mykiss</i>)	SoC	SV	2
Plants (3)			
Estes' artemisia (<i>Artemisia ludoviciana</i> ssp. <i>estesii</i>)	SoC	--	1
Peck's Long-bearded Mariposa-lily (<i>Calochortus longebarbatus</i> var. <i>peckii</i>)	SoC	--	1
Columbia Cress (<i>Rorippa columbiae</i>)	SoC	--	1

Source: FWS 2000a, ODFW 2000, ONHP 2001.

Footnotes:

- ¹ FWS Classification: E= Listed as Endangered; T= Listed as Threatened; P= Proposed for Federal listing; C= Candidate for Federal listing; SoC= Federal species of concern.
- ² ODFW Status: E= endangered; T= threatened; SC= Sensitive Critical- species for which listing as threatened or endangered is not imminent and can be avoided through protective measures; SP/R= Sensitive Peripheral/Rare-species that are on the edge of their range or that are naturally rare; SU= Sensitive Undetermined- species for which status is unclear; SV= State vulnerable- species for which listing as threatened or endangered is not believed to be imminent and can be avoided through continued or expanded use of adequate protection measures and monitoring.
- ³ ONHP Status: 1= List 1- taxa threatened with extinction or presumed extinct throughout their range; 3= species for which information is needed before status can be determined but which may be threatened or endangered in Oregon or throughout their range; 4= List 2- taxa threatened with extirpation or presumed extinct from the state of Oregon.
- ⁴ FWS lists the Oregon spotted frog as potentially occurring within Prineville Reservoir. The Oregon spotted frog, a Federal candidate species, was split into two species in 1996: the Oregon spotted frog (*R. pretiosa*) and the Columbia spotted frog (*R. luteiventris*) (Green et al. 1996). It is the Oregon spotted frog that could potentially occur near Prineville Reservoir (Csuti et al. 1997).

The bald eagle, a Federally threatened species, is the most easily observable TES wildlife species near Prineville reservoir. The RMP study area supports resident, migrant, and wintering bald eagles. The bald eagle has met recovery goals in many areas and is currently proposed for delisting (64 Federal Register 36453-36464, July 6, 1999). ODFW conducts a mid-winter count of bald eagles at Prineville Reservoir and Oregon State University, and OPRD staff cooperate to monitor the eagle nest on BLM property above Prineville Reservoir (pers. comm., Isaacs, 2002)

The bald eagle utilizes a variety of habitats over its life history stages, from fresh and saltwater shorelines to mature coniferous forest. Breeding habitat is predominately composed of mature

coniferous forest, with an uneven vertical structure and old-growth characteristics (Rodrick and Milner 1996). These breeding areas are located near large bodies of water, used for foraging, and have low human disturbance levels (Rodrick and Milner 1996). Like many raptor species, bald eagles utilize the same nest site over many years (Ehrlich et al. 1988). A pair of resident eagles has been documented to maintain a nesting territory to the south-southwest of Juniper Point, on BLM property adjacent to Reclamation-owned lands (ONHP 2001). This nest site is known to be a successful breeding site (ONHP 2001). The presence of this one breeding territory at Prineville Reservoir fulfills the Pacific states' recovery goal of one territory for this area. Current management needs have been identified as annual territory monitoring to ensure the persistence and success of this nest site (FWS 1986). A second bald eagle nest was located in 2002 on BLM property adjacent to the SWA. ODFW, BLM, and Reclamation are coordinating efforts to determine the status of the nest (i.e., is it an active nest?) and will develop a specific management plan as needed.

Winter roost sites represent another component of eagle habitat needs. During winter months, eagles concentrate in areas of high prey availability and low disturbance (Keister and Anthony 1983; Rodrick and Milner 1996). Winter nighttime roosts are composed of mature stands of trees, close to foraging sites (Keister and Anthony 1983). In the Prineville area, research has shown a strong preference for conifers that are isolated from human activities (Isaacs et al. 1993). Daytime roost sites are located along foraging areas in emergent trees and snags (Rodrick and Milner 1996). A large wintering population of bald eagles is located at the eastern edge of Prineville Reservoir (Isaacs et al. 1993). This wintering group, which extends from the eastern edge of Prineville Reservoir up the Crooked River to the Rager Ranger Station (a total of approximately 95 miles), has been estimated to be as large as 115 birds (Isaacs et al. 1993). This is a record number of eagles utilizing eastern Oregon habitats (Isaacs et al. 1993).

Nesting and wintering eagle populations forage on a variety of prey items. Regional research has shown that eagles in eastern Oregon rely on mammals, birds, reptiles, and especially on fish species for forage (McShane et al. 1998). Local research has shown that the main prey items for the Crooked River wintering population are large mammal (deer and livestock) carcasses and ground squirrels (*Spermophilus* spp.) (Isaacs et al. 1993).

Twelve species designated as species of concern or candidate species by FWS or species with an ONHP rank of 1 or 2 may occur in the RMP study area. Three species also have Oregon state status. Brief descriptions of potential habitat and occurrence of species of concern are presented below by taxonomic group.

The tricolored blackbird, a migrant in central and northern Oregon, has a patchy and unpredictable distribution in the state (Csuti et al. 1997). This species uses wetland areas for breeding and foraging (Csuti et al. 1997). It is a highly colonial species, and populations can grow into the thousands in some locations. The RMP study area is located at the northern extent of the range for this species, though breeding groups have been observed as far north as Portland, Oregon (USGS 2000; Csuti et al. 1997). Habitat for this species may exist at the northern end of the reservoir in the tall grassy/sedge areas in the wetland and riparian habitats (W&H Pacific 2000).

Sage grouse utilize sagebrush habitat, where big sagebrush covers 15 percent to 50 percent of the ground (Csuti et al. 1997). In addition to these densely vegetated areas, open habitat is used for leking behavior, which occurs in the early spring when male birds concentrate for breeding displays (Csuti et al. 1997). This habitat type is available around the reservoir (W&H Pacific 2000). This grouse species is known to

occur in the upper Bear Creek basin, within 3 miles of the southern extent of the reservoir (pers. comm., Ferry 2001). Local ODFW biologists believe that there are no lek sites in the RMP study area due to the high density of juniper woodlands (pers. comm., Ferry, 2000). Habitat loss and modification are blamed for the decline of sage grouse (Paige 1999b).

The peregrine falcon (*Falco peregrinus anatum*) was removed from the Federal list of endangered species in August 1999 (as published in the Federal Register, 64 FR 46541-46558) but remains listed as endangered in Oregon State. This is one of the world's most wide-ranging bird species, and thus would be expected to overlap with the RMP study area. Habitat limitations are most likely suitable nesting sites, which are commonly cliff sites within areas of open and abundant hunting opportunities (Csuti et al. 1997). Prey species are primarily small birds captured on the wing. Illegal collection of eggs and young for falconry trade is one of their greatest threats (Csuti et al. 1997). Peregrine falcons likely travel through the area but are not known to breed near Prineville Reservoir.

The pygmy rabbit is the only mammalian Federal species of concern with an ONHP rank of 2 that potentially occurs at the RMP study site. There are no occurrence data for this species in the RMP study area, but the range and habitat requirements for the pygmy rabbit do overlap with the RMP study area (Csuti et al. 1997). Pygmy rabbits potentially exist in the area but have yet to be documented. Habitat for this species is generally dense areas of sagebrush in areas of deep, loose soils that are easily moved for burrows (Johnson and Cassidy 1997). Sagebrush is also a main staple of the diet of this species (Johnson and Cassidy 1997). The spotted bat (*Euderma maculatum*) is listed as a species of concern and has an ONHP ranking of 2 and is likely found in the vicinity of Prineville Reservoir.

3.6.1.2 Fish

Native redband trout occur in many headwater tributaries of the Crooked River, primarily on USFS land. Many of these headwater streams are intermittent or ephemeral and provide extremely limited or seasonal habitat for redband trout. Downstream, on private lands and in the mainstem Crooked River, flows decline significantly due to irrigation withdrawal and water temperature increases. Populations of redband trout are depressed compared to historical abundance because the Crooked River and its tributaries have poor riparian and instream conditions. Native redband trout are found in headwater tributaries of Bear Creek and were reported below the confluence of Little Bear Creek in 1978, and in Sanford Creek in 1977 at RM 8.0 (ODFW 1996). The Chimney Rock section of the Crooked River below Bowman Dam also provides habitat for redband trout. Prineville Reservoir does not provide habitat for native redband trout (ODFW 1996).

3.6.1.3 Plants

Based on information provided by FWS and ONHP as well as surveys conducted by OPRD, three plant species considered Species of Concern with an ONHP rank potentially occur within the RMP study area. Estes' artemisia (*Artemisia ludoviciana* ssp. *estesii*) is typically found in sandy, gravelly, and moist riparian areas in central and south-central Oregon (W&H Pacific 2000; Massey undated). This plant requires open to partially shaded areas, and is believed to do poorly in areas of dense shading or steep slopes (W&H Pacific 2000). This species was collected in 1949 along Bear Creek, which feeds into the reservoir on the southwestern shore (ONHP 2001). Four additional populations of this plant have been documented in the reservoir area (W&H Pacific 2000). These populations were noted at Jasper Point boat ramp, Big Bend recreation site, Juniper Bass campsite, and on a gravel bar along the Crooked River, upstream of the reservoir. All four populations are located near the normal full pool shoreline.

Peck's long-bearded mariposa-lily (*Calochortus longebarbatus* var. *peckii*) is a species of seasonally wet meadows in regions of ponderosa pine forests (Massey undated). Soil types of preferred areas include cobble to stony clay loam soils, which are high in organic matter (Massey undated). This species is often associated with *Artemisia* species (W&H Pacific 2000). This species has not been documented in the RMP study area, but associated habitat may occur in the RMP study area (W&H Pacific 2000).

Columbia cress (*Rorippa columbiae*) is typically found in the wet soils of vernal pools, stream and lake margins, irrigation ditches, meadows, and in intermittent riparian areas (W&H Pacific 2000; Massey, undated). This species has not been documented in the RMP study area, but associated habitat may occur in the drawdown zones of the reservoir (W&H Pacific 2000). This species is thought to have evolved with systems that experienced occasional flooding and scouring (TNC 1999).

3.6.2 Environmental Consequences

Canada lynx does not occur on Reclamation or adjacent land, and implementation of the RMP would have no effect to this species. Greater sage grouse and pygmy rabbit could potentially occur in the RMP study area, but their occurrence has not been documented on Reclamation land or in the general vicinity. Activities that remove or disturb sagebrush habitat could affect these species, but because their occurrence in the RMP study area is doubtful, there would likely be no effect to these species. Two rare plants, Peck's long-bearded mariposa lily and Columbia cress, could potentially occur in the vicinity but have not been detected. Because no wide-ranging surveys have been conducted for these species, pre-construction surveys would have to be conducted under all alternatives to ensure that facility development would not affect these species.

The tricolored blackbird has not been documented at Prineville Reservoir, but it is possible the species uses wetland or riparian habitat in the area. The Oregon spotted frog, bald eagle, interior redband trout, and Estes' artemisia have been documented on or near Reclamation land at Prineville Reservoir, and the potential effects to these species are described below.

3.6.2.1 Alternative A-No Action: Continuation of Existing Management Practices

Enforcement of the ban on ORV use under Alternative A would decrease shoreline impacts, which would benefit species that may occur in the area including the spotted frog, bald eagle, tricolored blackbird, Estes' artemisia, and Columbia cress. These benefits would be less than the benefits provided under the Action Alternatives.

Alternative A does not include provisions for protection of species that have no Federal listing and are not protected under the Oregon Department of Agriculture's endangered species status. This could result in adverse effects to Estes' artemisia, which has no State or Federal protection.

Development and implementation of a Habitat and Wildlife Management Plan under Alternative A would focus on the SWA; however, this plan would extend when appropriate to the entire RMP study area. The development of this plan would benefit wildlife and habitats, especially those with specific management strategies outlined in the plan. Species of concern are proposed to be included in the Prineville Reservoir Habitat and Wildlife Management Plan.

Fisheries management actions under Alternative A would benefit redband trout by the development and implementation of a Fisheries Management Plan.

Fencing would be improved under Alternative A to limit livestock use of wetland, riparian, and shoreline habitats. This would benefit TES species that may occur in these habitats including spotted frogs, tricolored blackbirds, and Estes' artemisia. Continued designation of the southern shoreline of Prineville Reservoir, from Roberts Bay to Long Hollow Creek, as a day use area only would limit human disturbance and benefit TES species that may occur there.

Recreation actions taken under Alternative A would be generally positive with respect to TES species; designating campsites is preferred over dispersed camping. However, Estes' artemisia at the Juniper Bass site would not be well protected under this alternative and recreational development and activities may impact plants.

The provision of designated campsites for areas in the SWA (except Combs Flat) would reduce impacts to vegetation along the Crooked River and reservoir shoreline, which would be beneficial to rare species that may occur here. Unregulated use of the north shore of the SWA and at Combs Flat would contribute to habitat degradation and the potentially corresponding effects to TES species.

Development of north shore facilities outside the SWA would have no effect to TES species, but continued recreation use at Jasper Point and Big Bend may affect known populations of Artemisia that occur at these sites. Alternative A provides no monitoring of these populations to determine if current use is affecting these plants, which would aid in implementing adaptive management strategies.

The bald eagle nest on BLM property on the south side of the reservoir is outside the 2,600 foot-wide buffer recommended by the Pacific Bald Eagle Recovery Plan (FWS 1986) where the nest is in a direct line-of-sight of human activity. Roberts Bay recreation sites are the closest to the bald eagle nest on the ridge south of the reservoir on BLM land. Implementation of Alternative A would have no effect on bald eagles or other TES species in the vicinity of Roberts Bay. Designation of campsites would reduce vegetation disturbance and allow for increased growth of potential eagle perch sites. Recent nesting eagle activity on BLM land adjacent to the SWA could be affected by recreation use at Owl Creek.

Implementation of Alternative A would have no effect to Federally listed or proposed threatened or endangered species.

Mitigation and Residual Impacts [Alternative A]

No mitigation measures are proposed for Alternative A because the actions under this alternative do not have impacts on TES species in the RMP study area. BMPs listed in Chapter 5 (Environmental Commitments) are included for all alternatives. The residual impacts are previously discussed in more detail in the above narrative.

Cumulative Impacts [Alternative A]

Continued increases in recreation use could affect TES species. Increased use of shoreline, wetland, and riparian habitat could potentially affect unknown occurrences of Columbia cress, Artemisia, and redband trout that use the upper river or the reservoir. Disturbance of upland habitat from recreation could affect unknown occurrences of Peck's long-bearded mariposa lily.

3.6.2.2 Alternative B: Natural Resource/Dispersed Recreation Balance

Impacts to TES species under Alternative B would be the same as those described under Alternative A, except as noted. Alternative B includes the protection of Estes' artemisia on Reclamation land, which is not part of Alternative A. Clearly this would provide benefits to this species.

Alternative B does not include provisions for development of a Fisheries Management Plan at Prineville Reservoir that would address redband trout. Construction of additional fencing to restrict livestock use of sensitive habitats would provide benefits for the Oregon spotted frog, especially near Bear Creek where there is a documented occurrence of this species. Tricolored blackbird, interior redband trout, Estes' artemisia, and any occurrence of Columbia cress would benefit from this protection of riparian and wetland areas.

Continued uncontrolled recreation use of the north shore of the SWA and of upland campsites would further degrade upland, riparian, and shoreline habitat and could affect spotted frogs, redband trout, Artemisia, Columbia cress, and Peck's long-bearded mariposa lily.

Development of north shore recreation facilities are not expected to affect TES species, but pre-construction surveys would be conducted prior to earth-moving activity to ensure protection for upland species that occur in the vicinity of specific recreation developments. In addition, new boat ramps or expansion of existing boat ramp facilities would include pre-construction surveys. Impacts from the development of the south shore recreation sites would not affect TES species, but pre-construction surveys would also be conducted for these facilities.

Implementation of Alternative B would have no effect on Federally listed or proposed threatened or endangered species.

Mitigation and Residual Impacts [Alternative B]

No mitigation measures are proposed for Alternative B because the actions under this alternative do not have impacts on TES species in the RMP study area. BMPs listed in Chapter 5 (Environmental Commitments) are included for all alternatives. The residual impacts are previously discussed in more detail in the above narrative.

Cumulative Impacts [Alternative B]

While Alternative B provides some increased protection for Estes' artemisia, cumulative impacts under Alternative B would be similar to those described under Alternative A. Increased recreation use of reservoir lands corresponding to increased population in the vicinity would cause cumulative impacts to TES species. Measures to control recreation use would minimize but not eliminate these impacts.

3.6.2.3 Alternative C: Natural Resource Protection/Formal Recreation Emphasis (Preferred Alternative)

Additional efforts to control vehicle access under Alternative C would benefit all habitat types on Reclamation land and therefore could potentially benefit TES species. Little information is known about the two bald eagle nests located near the reservoir and whether human activities may, or may not, be affecting them. Alternative C provides for a comprehensive monitoring program of bald eagle nest and winter roost areas. The Habitat and Wildlife Management Plan would include a component for bald and golden eagle management. This plan would be developed in cooperation with OPRD, ODFW, FWS and

BLM. Alternative C would also define and limit areas for overnight camping in the SWA and at Roberts Bay. We have determined that Alternative C may affect, but is not likely to adversely affect, the bald eagle. Alternative C would have no effect to other listed, proposed, or candidate species. Terrestrial restoration efforts under Alternative C would provide similar benefits as under Alternative B. The development of a Fisheries management Plan and increased cooperative efforts with ODFW and FWS would benefit aquatic resources, including the redband trout.

Improved fencing would benefit riparian and wetland habitats that may provide habitat for Oregon spotted frog, especially near Bear Creek, tricolored blackbird, interior redband trout, Estes' artemisia, and possibly Columbia cress. Benefits from this action would be more substantial under Alternative C compared to the other alternatives. Monitoring of the known populations of Estes' Artemisia would provide information for management and would provide long-term benefits.

Designation of campsites in the SWA would provide similar benefits to TES species as described under Alternative A. In addition, designating Combs Flat as a day use area only and the prohibition of dispersed camping outside designated areas in the SWA would provide additional benefits to all habitats in the SWA and to TES species that may occur here.

Implementation of Alternative C recreation sites on the north shore outside the SWA would provide similar impacts as described under Alternative B. The development of recreation sites on the south shore of the reservoir outside the SWA would have no effect to TES species with the provision of pre-construction surveys for TES plants.

Mitigation and Residual Impacts [Alternative C]

No mitigation measures are proposed for Alternative C because the actions under this alternative do not have impacts on TES species in the RMP study area. BMPs listed in Chapter 5 (Environmental Commitments) are included for all alternatives. The residual impacts are previously discussed in more detail in the above narrative.

Cumulative Impacts [Alternative C]

Cumulative impacts resulting from Alternative C would be slightly less than those described under Alternative B. Efforts to monitor bald eagle nest and roost sites would help reduce potential cumulative effects of increased recreation use.

3.7 Recreation

3.7.1 Affected Environment

Recreation activities in the study area include both land- and water-based activities. Most of the recreational users of this area are from either the Central Oregon counties of Crook, Jefferson, and Deschutes, or the Portland metropolitan area counties of Multnomah, Washington, and Clackamas. The number of visitors approaching from south of Prineville Reservoir has increased markedly due to the improvements and paving of the Alfalfa Market Highway, which provides a connection to Bend, Oregon (pers. comm., Bill Crawford, OPRD, 2002).

Prineville Reservoir is located in Region 7 of the Oregon Statewide Comprehensive Outdoor Recreation Plan (SCORP). Region 7 includes Jefferson, Wheeler, Crook, and Deschutes Counties. Within or nearby Region 7 there are five reservoirs offering similar recreation opportunities to those found at Prineville Reservoir. These include: Haystack Reservoir, Ochoco Reservoir, Crane Prairie Reservoir, Wickiup Reservoir, and Lake Billy Chinook. There are four State Parks within 50 miles of Prineville Reservoir, including The Cove Palisades, Tumalo, Smith Rock, and La Pine State Parks. In addition, there are nearly 50 campgrounds provided by other land managers, such as USFS and BLM, within 50 miles of Prineville Reservoir. Given the demand for recreation and continuing population growth in central Oregon, all of these facilities will need to play a role in satisfying future recreation needs.

3.7.1.1 Recreation Activities and Use Levels

Recreation use at Prineville Reservoir includes many land- and water-based activities typical of the lakes and reservoirs in Central Oregon. Prineville Reservoir is a popular water body that is experiencing increasing levels of use. According to studies by the Oregon State Marine Board (OSMB), Prineville Reservoir is ranked 17th in Oregon in boater activity days, with 41,170 in 1998 (OSMB 1999). This represents nearly an 8 percent increase over the number of activity days in 1995 (OSMB 1996). Camping activity at Prineville Reservoir has also steadily increased. Table 3.7-1 shows the number of campsites sold as well as traffic counts at campgrounds for the period between 1993 and 2000. There were a total of 5,794 campsites sold in 1993 compared to 7,161 in 2000. While the 2000 figure does not reflect normal use due to extreme low water conditions, there was still a 19 percent increase in the number of campsites sold during this period. Overall visitation at the reservoir was estimated to be 422,788 in 1999, and has been steadily increasing for several years. Table 3.7-2 provides visitation figures for the period between September 1999 through August 2000. Table 3.7-3 provides visitation figures for several of the recreation facilities for the period between May 2000 and August 2000. These figures do not provide total visitation for Prineville Reservoir; however, the table provides the percent of total use each of these sites represents of all developed recreation sites.

3.7.1.2 Recreation Facilities

Developed recreation facilities are provided at numerous locations around Prineville Reservoir by OPRD and a private concessionaire. Both developed and undeveloped dispersed sites provide areas for visitors to engage in various recreation activities. The type and location of recreation facilities provided at Prineville Reservoir are listed in Table 3.7-4.

Table 3.7-1: Prineville Reservoir visitation, 1993-2000.

	1993	1994	1995	1996	1997	1998	1999	2000
Campground Sites Sold	5,794	5,550	6,731	6,716	7,174	7,842	8,599	7,161
Traffic Count	124,815	119,942	122,775	121,196	122,620	129,275	144,629	91,891

Source: OPRD 2002.

Note: OPRD uses a multiplier statewide of 4 occupants per vehicle and 3.3 persons per campsite. No multiplier has been used on above actual count numbers.

Table 3.7-2: Prineville Reservoir visitation, September 1999 to August 2000.

	Prineville State Park	Jasper Point	Powder House Cove	Roberts Bay	County Boat Ramp	Prineville Reservoir	SE Prineville Lake Access RD E	SE Prineville Lake Access RD W	Totals
SEP	31,326	na	na	na	na	na	na	na	31,326
OCT	10,012	na	na	na	na	na	na	na	10,012
NOV	3,444	na	na	na	na	na	na	na	3,444
DEC	2,332	na	na	na	na	na	na	na	2,332
JAN	2,101	na	na	na	na	na	na	na	2,101
FEB	1,753	na	2,072	624	604	na	na	na	5,053
MAR	3,654	2,492	4,292	1,392	na	na	na	na	11,830
APR	5,982	5,098	5,296	1,820	1,456	na	na	na	19,652
MAY	13,181	10,066	13,408	2,452	3,012	na	1,964	1,264	45,347
JUN	21,270	17,656	10,624	3,628	3,656	na	4,146	3,244	64,224
JUL	29,442	24,660	15,576	5,972	6,028	na	10,178	8,220	100,076
AUG	26,987	16,648	na	9,516	8,204	na	16,272	14,764	92,391
TOTAL	151,484	76,620	51,268	25,404	22,960	35,000	32,560	27,492	422,788

Source: OPRD 2002.

na = Not available

Table 3.7-3: Prineville Reservoir visitation, May 2000 to August 2000.

	Prineville State Park	Jasper Point	Powder House Cove	Prineville Reservoir	Roberts Bay	County Boat Ramp
MAY	13,181	10,066	13,408	8,750*	2,452	3,012
JUN	21,270	17,656	10,624	8,750*	3,628	3,656
JUL	29,442	24,660	15,576	8,750*	5,972	6,028
AUG	26,987	16,648	13,203*	8,750*	9,516	8,204
TOTAL	90,880	69,030	52,811	35,000	21,568	20,900
Percent of Total Use of All Developed Rec. Sites	31%	24%	18%	12%	7%	7%

Source: OPRD 2002.

*Estimated from total use numbers.

Note: Number total will not equal 100 due to rounding. Does not include boat-in sites.

Prineville State Park is the main public park development at Prineville Reservoir and is also the most popular use area on the reservoir. It is located on the northern shoreline of the reservoir at the end of the Juniper Canyon Road that leads to the City of Prineville. This site contains two distinct areas, the campground and a large day use area with a boat ramp. The campground contains 70 campsites with varying levels of amenities, including one accessible site. "Accessibility" is defined as providing participation in programs and use of facilities to persons with a disability. "Disability" is defined with respect to an individual as a physical or mental impairment that substantially limits one or more of the major life activities of such individual; a record of such an impairment; or being regarded as having such an impairment (Americans with Disabilities Act of 1990). Twenty-two of the sites have full hookups (water, sewer, and electricity), 23 sites have electricity and water, and 25 sites are designed for tent campers and have water faucets nearby. Most of the sites are shaded and have ample grassy areas. The

Table 3.7-4: Facility locations at Prineville Reservoir.

	Boat Ramp	Picnic Area	Cabins	Developed Camping	Dispersed Camping	Swimming Area	Trails	Fishing Access
Prineville State Park	x	x	x	x		x	x	x
County Boat Ramp	x							
Big Bend				x				
Powder House Cove	x							
Roberts Bay West	x	x			x			
Roberts Bay East		x			x			
Prineville Reservoir Resort	x		x	x				
Jasper Point	x			x				
Owl Creek		x			x			
Juniper Bass					x			
Old Field					x			x
Cattle Guard					x			
Bear Creek					x			x
Antelope Creek								x
Combs Flat					x			x

Source: Provided by EDAW.

campground also has a modern restroom facility with flush toilets and hot showers. In addition to these facilities, the campground also has 5 cabins available for visitor use. Three of these are larger deluxe cabins that sleep 6 and have kitchen and restroom facilities. The remaining two cabins are one room rustic cabins that sleep 4 and do not have kitchen or restroom facilities. All of the cabins and campsites are able to be reserved in advance through Reservations Northwest, who administer reservations for OPRD. There is also a boat moorage facility with 32 spaces for use by visitors staying in the park. The cabins and a portion of the campsites are open year-round. A 1.75-mile shoreline trail leads from the campground to Jasper Point. An amphitheater is also located nearby that is used for educational programs.

The day use area and boat launch are located directly adjacent to the campground on the shoreline of Prineville Reservoir. The day use area facilities include picnic tables, BBQs, playground, picnic shelter/kitchen, large shaded grassy areas, a beach with a designated swimming area, concession stand, restrooms, showers, fish cleaning station, volleyball net, and a large parking area (shared with the boat launch). Facilities at the boat launch include 2 ramp lanes, a boarding float, and a parking area (shared with the day use area). In total, the site has 45 single vehicle parking spaces and 60 boat trailer parking spaces. The boat launch is the deepest on the reservoir, and it is the only ramp that can be used as pool levels are lowered in the off-season. Recent renovations included the creation of additional boat trailer parking spaces. Both the boat launch and the day use area are popular with campers and other visitors to the reservoir.

Prineville Reservoir Resort is located on the northern shoreline of the reservoir at the tip of a peninsula. The resort is run as a concession through an agreement with Reclamation and is the only privately managed recreation facility on the reservoir. The resort consists of a campground, motel, and boat launch, all of which are popular and heavily utilized during the peak use season. The campground

consists of 69 campsites, all of which have hookups for water and electricity, many of which are directly on the water. In addition, the campground also features restrooms/showers, a volleyball court, horseshoe pits, an RV dump station, and a rustic cabin available for nightly rental. The boat launch is adjacent to the campground and features boat ramp lanes, marina slips, a gas dock, and boat rentals. Other facilities at the resort include a 7-unit motel, fish cleaning station, convenience store, and small restaurant. Enhancements or improvements for recreation facilities at Prineville Resort will be considered, subject to an economic feasibility study. Recreation enhancements or improvements would not be developed and/or funded by Reclamation, but would be negotiated as part of a lease renewal at any new business opportunity at the existing location of the resort. Social Security Beach is a reservoir shoreline area just south of the Bottero Subdivision that is a popular spot for elderly people to drive in the drawdown zone to gain access for fishing.

Jasper Point Campground is a relatively new facility developed by OPRD and is located on the northern shoreline of the reservoir. As recently as 1995, this was the most heavily used dispersed camping area on the reservoir and frequently would contain as many as 200 campsites. The current site consists of a small developed campground and a new boat launch facility. The 30-site campground is designed to be more primitive and rustic than the main State Park campground, thus offering a range of settings for visitors to the area. Water and electricity are provided at each site. Other facilities include two vault toilets and parking for 10 boat trailers. A boat launch adjacent to the campground features a 2-lane concrete boat ramp, a paved parking area with spaces for 22 vehicles and 40 vehicles with trailers, a vault toilet, and a dump station.

There are four designated dispersed recreation sites along the North Side Primitive Road within the SWA: Owl Creek, Juniper Bass, Cattle Guard, and Old Field. North Side Primitive Road runs from Jasper Point to the Paulina Highway and is mostly rough gravel, although it can be used by most passenger vehicles in dry weather.

Owl Creek is managed as a walk-in/boat-in use area and has parking for about 10 vehicles. Features at this site include 3 picnic tables, 2 portable toilets, and about 10 dispersed campsites, several of which appear to be heavily used. Most of these sites are spread throughout an area of junipers along the shoreline of the reservoir. Road access to this site is closed from November 15 to April 15.

Juniper Bass is a designated dispersed use area located along a spur road about a ½ mile south of the North Side Primitive Road. The ability for vehicles to access the shoreline at this site has created a long narrow area of about 10 scattered dispersed campsites. Day use appears to be more common at this site than overnight use, as the site is barren and lacks shade. At low pool levels, vehicle access along the shoreline extends far to the east and west of the site. Road access to this site is closed from November 15 to April 15.

Cattle Guard is a moderate-sized designated dispersed site just south of the North Side Primitive Road along the shoreline of the reservoir. Features at this site include one primary site with a picnic table and five smaller use areas nearby, each with a user-constructed fire ring. The main site is located on a small bluff overlooking the reservoir. Road access to this site is closed from November 15 to April 15.

Old Field is a large designated dispersed area consisting of three separate areas, all of which are heavily used by visitors. This site is the farthest east of the sites on the North Side Primitive Road and is nearest to the Paulina Highway. The three primary areas at this site include a forested area just west of the main entrance (6 dispersed sites and 1 portable toilet), a large barren area just east of the main entrance (1

dispersed site), and a long, wide area along the shoreline with a network of dirt roads that is primarily a fishing access point (5 dispersed sites). Each of these areas contains many more camps than indicated during peak season weekends. Road access to this site is closed from December 15 to March 15.

Roberts Bay East is the most heavily used recreation area on the south shore and is the most popular dispersed recreation area on the reservoir. Features of this site include 12 picnic tables, 4 vault toilets—as well as additional portable toilets during the peak use season—and as many as 50 distinct dispersed campsites with user-constructed fire rings. Trash cans are also provided during the peak use season. Twenty of the dispersed sites are on a small peninsula and have gravel parking spurs and some shade. The remaining sites are scattered throughout the main use area along the western shoreline of Roberts Bay which is interspersed with some juniper trees that provide limited shade. However, much of the use of this site occurs directly on the shoreline and in the areas below the full pool level that are exposed as the summer progresses. Although the area lacks a formal boat launch, the gentle slope of the shoreline and lack of rocks or trees allows visitors to launch from many portions of the site.

Roberts Bay West is a small designated dispersed site at the western end of the Roberts Bay area. Features of this site include an informal gravel/rock boat ramp, three picnic tables, and approximately ten dispersed campsites. Portable toilets are also provided at this site during the peak season and are highly visible from the water, resulting in heavy use from boaters in the area. The primary focus of users to this site is the boat launch, which is comparable to the facility at Powder House Cove in terms of the condition of the “ramp” (i.e., as it is long and straight). One picnic table and as many as eight dispersed campsites are located near the wetland area between this site and Roberts Bay East.

Juniper Point is a designated dispersed site located on a small bay on the southern shoreline of the reservoir. This designated dispersed site is more primitive and lightly used than the adjacent areas of Roberts Bay. Current access to the site is via the Salt Creek Road followed by a rough and unimproved gravel road also known as the Roberts Bay Road. There are an estimated 20 dispersed campsites at Juniper Point, most of which do not receive much use except on peak season weekends. There are three picnic tables at this site, and portable toilets and trash cans are provided during the peak use season.

Powder House Cove is a physically small day use area with high use at the western end of the local reservoir just south of Bowman Dam, near the old powder house used to store explosives during dam construction. Situated along Highway 27 that runs directly into Bend, this area is becoming increasingly popular among visitors from the south as it is the closest boat launch on Prineville Reservoir for most residents of Deschutes County and other points south, and the highway was recently paved. Features of this site include a 1-lane boat launch, two gravel parking areas, and two vault toilets. Portable toilets and trash cans are installed at the site during the peak use season. The existing boat launch is best characterized as primitive as it has a gravel surface only on the upper-most portions before becoming mostly dirt on the lower portions. Given the popularity of this site, overflow parking commonly occurs on the shoulder of Highway 27, creating a traffic hazard. Boats also launch from numerous locations along the shoreline in the cove.

Big Bend is a large Reclamation-owned site just below Bowman Dam along the banks of the Crooked River. Big Bend is cooperatively managed for Reclamation by BLM through agreement with OPRD. For many years, this site has been managed to allow for dispersed day use and camping and has typically represented an optional use area for visitors to the reservoir when conditions become too crowded at Powder House Cove. This area is also popular among anglers who use this site as an easy access point to the tailrace of the dam as well as other areas downstream. As many as 40 distinct dispersed sites have

been identified at this site in recent years, many of which were located in sensitive riparian areas along the river. Site improvements completed in 2001 were undertaken to formalize use at this site. Fifteen distinct campsites have been designated, all of which are located above the riparian zone of the river. Vehicle access to the shoreline and upstream areas below the dam has been blocked to reduce impacts and ensure visitor and dam safety. A self-service fee station, two toilets, and other tent camping and day use picnic areas have been added to the site.

The County boat ramp is one of five developed boat ramps on the reservoir, located on the northern shoreline a few miles west of the State Park. Due to its proximity to the city of Prineville, this is a popular boat launch for visitors arriving from the north. There are few facilities at this site, including a one-lane asphalt ramp, a gravel parking area, and portable toilets.

Aside from the designated dispersed sites around the reservoir, there are many other areas that visitors use for day use or overnight camping that are accessible by vehicle. Many of these areas can also be accessed by boat. One of these sites is Bear Creek, on the southern shore of the reservoir east of Powder House Cove. This area has approximately 5 dispersed campsites and is also a walk-in access point for anglers. It is only popular in the early season as this shallow arm of the reservoir dries up quickly as pool levels fall. Another popular dispersed area is Antelope Creek. This area is near the spot where the road to Jasper Point branches off from the main road. A small gravel parking area (7 vehicles) is located just off the main road. A large beach area in the western portion of the Prineville Reservoir Resort area, commonly known as Social Security Beach, is a popular day use area for visitors where vehicles have been gaining access to a 0.25-mile stretch of shoreline.

Another popular dispersed area is near the intersection of North Side Primitive Road and Paulina Highway. This relatively flat area is in a location where the reservoir becomes braided and more riverine. The flat, open terrain sees more extensive ORV use than other areas around the reservoir and is also a popular area for camping and shoreline fishing.

In addition to the sites mentioned above, as many as 40 boat-in dispersed sites have been identified along the shoreline of the reservoir. Most of these sites are located at the western end of the reservoir and have user-constructed fire rings. Many sites have small beach areas, which make these the most popular sites.

Overall, Prineville Reservoir is popular among many types of boaters who visit the area and had more boater activity days in 1998 than all but two reservoirs in Crook, Jefferson, and Deschutes counties. Estimates of this use indicate that 43 percent of these activity days were anglers, 33 percent water-skiers, 20 percent general boat use (cruising), and 4 percent personal watercraft (PWC) riding. Although not included in this estimate, there is some sailboat use of the reservoir as well as a limited amount of non-motorized boating use such as canoeing and kayaking. Due to the popularity of the boat launch at Powder House Cove, much of the boating use occurs in the western sections of the reservoir. Eastern sections of the reservoir have a boat speed limit of 5 mph, making angling popular in these areas. The Marine Patrol enforces the speed limit and other boating regulations during patrols in the peak season.

3.7.2 Environmental Consequences

This section discusses the expected positive and adverse impacts of the RMP alternatives on recreation resources. A detailed discussion of impacts under each of the three alternatives is provided.

3.7.2.1 Alternative A – No Action: Continuation of Existing Management Practices

This alternative would result in the continued management of the RMP study area under the 1992 RMP. This alternative would allow for an increase in recreation development, principally near the existing Prineville State Park. This increase would include additional developed day use and overnight camping facilities, as well as designated dispersed campsites and a courtesy dock along the northern shoreline of the SWA. This alternative also calls for the elimination of livestock grazing from designated recreation areas by fencing.

The most considerable positive impacts on recreation under this alternative would be from the proposed developments at State Park North Expansion and Antelope Creek Day Use Area. Expanded recreation development at the State Park would more than double the capacity of the campground and would greatly increase the total acreage of the park devoted to active recreation. New recreation development at Antelope Creek Day Use Area would result in many new recreational opportunities and increase the capacity for visitors participating in picnicking, swimming, and boating.

Additional recreation development would also be allowed at several other areas. A new concrete boat ramp would be developed at Roberts Bay East, and boat ramp improvements would be undertaken at the County boat ramp, Prineville Reservoir Resort, and Powder House Cove. Improved or expanded parking would occur at Powder House Cove and the County boat ramp. Primitive designated campsites with minimal associated amenities would be developed at Roberts Bay East. In addition, a hiking/biking trail at Bear Creek would be permitted under this alternative.

Under this alternative, recreation use of the southern shore of the SWA would continue to be restricted to boat-in day use only; however, dispersed camping would be allowed in all other areas. Primitive designated campsites would be developed at each of the 4 designated recreation areas within the SWA, along with a courtesy dock at Owl Creek. These actions may reduce boat-in and/or general primitive camping opportunities at Prineville Reservoir.

In general, impacts associated with new development in Alternative A would have positive impacts on recreation by improving the experience available to visitors; however, the increased use concentrated near the State Park could potentially create a more crowded recreation experience, resulting in increased user conflicts and perceptions of crowding.

Some new recreation development has occurred at existing recreation sites since the 1992 RMP was completed. Examples include an increase in formal camping opportunities at Jasper Point and Big Bend Campgrounds. This trend is expected to continue under Alternative A. Examples of facility improvements include improved facilities at the SWA north shore recreation sites and a new day use area and boat ramp at Antelope Creek.

Under this alternative, there would be some impact on the type of visitor experience currently offered in the area. Primitive designated campsite development at the 4 designated recreation areas within the

SWA would impact these public recreation sites by eliminating the undeveloped and dispersed recreation experiences currently provided in these areas.

Overall, this alternative would have a positive impact on the recreational experience in the RMP study area, with a few exceptions for some user groups. Under this alternative, new and/or expanded facilities would increase the availability of camping, picnicking, swimming, and hiking facilities and opportunities. In addition, boating and fishing opportunities would increase substantially through several boat ramp improvements. Specific user groups, including boat-in and general primitive area campers, may be adversely affected under this alternative due to new restrictions and designated primitive campsite development.

Mitigation Measures and Residual Impacts [Alternative A]

No mitigation measures are proposed for Alternative A because the actions under this alternative do not have substantial adverse impacts on recreation in the RMP study area. BMPs listed in Chapter 5 (Environmental Commitments) are included for all alternatives. The residual impacts are previously discussed in more detail in the above narrative.

Cumulative Impacts [Alternative A]

Increased recreation use and regional population growth are likely to continue to put pressure on existing and proposed recreation facilities at Prineville Reservoir. Designated camp areas would likely be occupied and fill up earlier, and dispersed camping (such as Roberts Bay West) would be more densely occupied.

3.7.2.2 Alternative B – Natural Resource/Dispersed Recreation Balance

This alternative would allow for substantial additional recreation development beyond those actions allowed under Alternative A. In general, this alternative would have a positive effect on the recreation experience in the area, with a few exceptions discussed below. It is important to note, however, that while there would be many recreation actions under this alternative, many would primarily be related to less development-oriented opportunities, such as primitive campsites and trails.

As in Alternative A, Alternative B would allow for new development at the State Park North Expansion and Antelope Creek Day Use Area. Under Alternative B, the State Park North Expansion would include campsites, cabins, a group camp, and hiking trails. Alternative B also includes new recreation development at the existing State Park, such as expanded overnight moorage, infrastructure improvements, and a new dump station. Under Alternative B, the Antelope Creek Day Use Area would have a group day use area with a shelter and trail development. In addition, new development would occur at Juniper Point and Roberts Bay West.

One of the greatest differences between the No Action Alternative and Alternative B is the level of development allowed at Roberts Bay. At Roberts Bay East, Alternative B allows for a larger number of primitive campsites, a group camp, a camp host site, a day use area with swimming and picnicking, and trail development. Alternative B allows for primitive campsites, a boat launch and parking area, and trail development at Roberts Bay West. This is a higher level of development than allowed under the No Action Alternative.

Overall, Alternative B allows a higher level of recreation development at more sites, including infrastructure and maintenance facilities at several sites. Boat ramp improvements would be undertaken at the County boat ramp, Prineville Reservoir Resort, and Powder House Cove. Additional cabins, campsites, and moorage would be developed at Prineville Reservoir Resort, and primitive designated campsites and gravel roads would be developed at Juniper Point. The numbers of users of the Prineville Reservoir Resort would not appreciably differ from that of Alternatives A and C.

Recreation use of the south shore of the SWA would be restricted to boat-in day use only, with dispersed camping allowed in all other areas. Under Alternative B, no primitive designated campsites would be developed within the SWA; rather, existing conditions and use patterns would be continued. While this alternative may result in as many or more campsites, these campsites would not have any of the features or amenities of the designated primitive campsites under Alternative A.

Under this alternative, illegal ORV use would be reduced by increased enforcement, signage, road closures, and barriers. These actions would substantially reduce the activities carried out by ORV users, particularly in the reservoir drawdown zone and on informal roads. However, since ORV use is not allowed on Reclamation's land within the RMP study area no adverse effects to ORV use would occur.

Actions under Alternative B would have a positive impact on recreation. Overall, this alternative would have a positive impact on visitors seeking a less development-oriented recreation experience in the RMP study area, with a few exceptions for some user groups. Under this alternative, new and/or expanded facilities would increase the availability of developed camping, primitive camping, picnicking, boating, fishing, swimming, and hiking facilities and opportunities. Specific recreation activities, such as illegal ORV use, may be reduced under this alternative due to increased enforcement.

Mitigation Measures and Residual Impacts [Alternative B]

No mitigation measures are proposed for Alternative B because the actions under this alternative do not have substantial adverse impacts on recreation in the RMP study area. BMPs listed in Chapter 5 (Environmental Commitments) are included for all alternatives. The residual impacts are previously discussed in more detail in the above narrative.

Cumulative Impacts [Alternative B]

Increased recreation use and regional population growth are likely to continue to put pressure on existing and proposed recreation facilities at Prineville Reservoir. Dispersed campsites in the SWA would likely be used at a higher density than under Alternative A or C.

3.7.2.3 Alternative C – Natural Resource Protection/Formal Recreation Emphasis (Preferred Alternative)

This alternative would allow more substantial formal recreation development at several areas than either of the other 2 alternatives. Substantial new recreation development and opportunities would improve the developed recreation experience available to visitors.

Many actions under this alternative would apply to the entire reservoir area. Actions with a positive impact on recreation include providing a universally accessible fishing dock, visitor brochures and interpretive information, and a reservoir-wide sign program, as well as eliminating livestock grazing from recreation areas. These actions would positively affect those visitors seeking a more formal recreation experience and visitors with physical disabilities; however, visitors seeking less development-

oriented opportunities would likely be adversely affected. Other actions, such as increasing enforcement of illegal ORV use, issuing no new private access roads across the SWA, longer road closure dates between Old Field and Combs Flat Road, and restricted recreation use within the SWA, would similarly have both positive and adverse effects. These actions would be beneficial for visitors such as hikers and wildlife observers and would likely adversely affect primitive campers and ORV users (who are operating illegally).

This alternative differs somewhat from the other two alternatives in that recreation use of the entire SWA would be restricted to day use only outside of designated camping areas. As in Alternative A, primitive designated campsites would be developed at each of the 4 designated recreation areas within the SWA. In addition, the perimeter of the camping area and the number of sites would be defined, camper registration would be required at each of these areas. Additionally, non-motorized trail connections would be developed at Owl Creek, and trail connection potential would be explored at the other three areas. At the eastern end of the SWA, a non-motorized trail and trailhead would be developed at Combs Flat; in addition, the perimeter of this area would be defined. As noted above, these actions would likely have both positive and adverse impacts. Visitors seeking a more primitive camping experience would be adversely affected, while those wishing to participate in hiking and more formal camping activities would be positively affected. Development of more formal camping areas with a set number of designated campsites would be a benefit for those visitors who prefer a recreation area with a limited number of allowed visitors. This alternative also differs from the other two alternatives in its approach to dispersed boat-in use. In all three alternatives, the reservoir's southern shoreline from Roberts Bay to Long Hollow Creek would be managed as a boat-in day use area only with no overnight use allowed. In Alternatives A and B, dispersed camping would be allowed in all other areas of the SWA; however, in Alternative C, only day use is allowed outside of designated camping areas in the SWA.

Under Alternative C, both a campground, as proposed in Alternative A, and a cabin cluster, group camp, and trails, as proposed in Alternative B, would be developed at the State Park North Expansion. At the existing State Park, recreation elements and amenities developed would be the same as those under Alternative B, in addition to a concession store for rentals, an accessible fishing pier, and an additional 3 cabins. Recreation development under this alternative would be the same as under Alternative B at Juniper Point, Big Bend Campground, and Jasper Point.

Recreation development at Antelope Creek Day Use Area would be the same under Alternatives B and C; however, an accessible fishing pier and overflow parking would be developed at Antelope Creek Day Use Area under Alternative C. At the County boat ramp, recreation development would be the same as under Alternative A, with the addition of exploring the option of a new parking area and/or non-motorized trailhead. There could be substantial new development at Prineville Reservoir Resort under Alternative C, including the same recreation facilities as under Alternative B in addition to providing developed group campsites, a designated day use area, a loop trail and trailhead, and improved maintenance facilities. A defined area of the resort at Social Security Beach would permit vehicle access to the shoreline for the elderly and people with disabilities. Alternative C is designed to contain rather than expand existing use; consequently, little to no effect is expected on Prineville Reservoir Resort. Alternative C is designed to contain rather than expand existing use. Although numbers of camping and picnicking sites will increase, actual numbers of users are not expected to greatly increase as space will be limited largely to defined sites. There may be a shift from dispersed users to developed site users who will pay a fee for services.

Along the south shore of the reservoir, outside of the SWA, major recreation development would occur at Powder House Cove and Roberts Bay East. At Powder House Cove, new recreation development would include a boat ramp, access road and parking lot, additional truck and trailer parking, day use area, non-motorized interpretive loop trail, and vault toilets. At Roberts Bay East, recreation sites would be developed under a two-phase program. Upgrades include a full hookup campground, registration booth, group camps with picnic shelters, cabin cluster, RV dump station, overnight moorage area, additional host sites, and a fishing dock. Roberts Bay West would have a boat ramp and parking areas, non-motorized trailhead and trail to island, maintenance yard, employee housing, entrance gate, and host sites.

Reclamation would maintain safe access to recreation sites via the Roberts Bay (Salt Creek) Road commensurate with the level of recreation development. If legal access cannot be maintained, then the road may be closed. This action would be an adverse effect to campers and day users who access the south shore via this road.

In general, impacts under Alternative C would be beneficial to visitors seeking a more developed recreation experience. Substantial new recreation development would increase the recreation opportunities available to visitors and residents; however, this alternative would likely alter the character of the recreational experience currently available in the area by providing substantial new formal recreation development and limiting more primitive, dispersed recreation opportunities. Regardless of their desired type of recreational experience, visitors would benefit from the public health and safety improvements included in formal recreation development.

Relative to Alternative B, positive impacts on recreation would be even more pronounced under Alternative C. In general, the amount and extent of new recreation facilities and opportunities would be greater than under Alternative B. Examples include a high amenity campground with a cabin cluster and group camp at the State Park North Expansion Area, a concession store for rentals at the existing State Park, a potential day use area at Prineville Reservoir Resort, and a new boat ramp and day use area at Powder House Cove. Additional positive impacts of this alternative include the provision of visitor brochures and the development of a reservoir-wide sign program. These actions would better inform visitors about regulations as well as recreation opportunities. Increased enforcement of ORV restrictions would limit the level of this recreation activity in the area; however, no adverse impacts would occur since this is an unauthorized use of Reclamation lands.

Under this alternative, there would be some impact on the type of visitor experience currently offered in the area. Primitive designated campsite development at the 4 designated recreation areas within the SWA would be an adverse impact on those visitors seeking the undeveloped and dispersed recreation experiences currently provided. In addition, recreation use of the entire SWA would be restricted to day use only outside of designated camping areas. The alteration or elimination of this dispersed camping experience would potentially force visitors to use other existing sites as a substitute. Thus, increased visitation could occur in areas outside the SWA. The increased use outside the SWA would potentially create a more crowded recreation experience resulting in potential increased user conflicts, increased competition for available sites, and increased perceptions of crowding.

Mitigation Measures and Residual Impacts [Alternative C]

No mitigation measures are proposed for Alternative C because the actions under this alternative do not have substantial adverse impacts on recreation in the RMP study area. BMPs listed in Chapter 5

(Environmental Commitments) are included for all alternatives. The residual impacts are previously discussed in more detail in the above narrative.

Cumulative Impacts [Alternative C]

Increased recreation use and regional population growth are likely to continue to put pressure on existing and proposed recreation facilities at Prineville Reservoir. Designating campsites would control camping density but would likely increase the inability to meet the demand for camping during high use periods.

3.8 Visual Resources

3.8.1 Affected Environment

This section addresses visual resources within the RMP study area and in the general vicinity of Prineville Reservoir.

3.8.1.1 Summary of Visual Resource Conditions

The study area is located in the high rimrock desert of central Oregon, a region dominated by open grasslands, juniper stands, basalt outcrops, and brown and reddish soils. The landscape surrounding the reservoir is dominated by steeply sloping hills with occasional peaks and buttes in the distance. Prineville Reservoir itself is a long, meandering water body formed by an earthen dam at its west end approximately 245 feet high on the Crooked River. The reservoir is approximately 14.6 miles long and between approximately 50 and 4,700 feet wide. In addition to their primary purpose of providing irrigation water, Bowman Dam and Prineville Reservoir are designed for flood control; thus the surface of reservoir fluctuates seasonally as much as 97 vertical feet. At the higher operational range, the reservoir has 43 miles of shoreline that reduces to 6.4 miles at low pool.

The downstream portion of the reservoir lies within the Crooked River Canyon and is bounded on either shore by steeply sloping canyon walls. Near the dam, the canyon walls tower 800 feet above the reservoir at full pool (Figure 3.8-1), resulting in dramatic scenery. An 8-mile reach of the lower Crooked River between Bowman Dam and mile marker 12 of State Highway 27 (Chimney Rock



Figure 3.8-1: Crooked River Canyon's dramatic scenery as seen from Bowman Dam near Big Bend Campground.

segment) was designated by Congress in October 1988 as a National Wild and Scenic River and was classified as a recreational river area. Outstandingly remarkable values included scenic, recreation, and fishery values. This 8-mile reach was also designated as a component of the National Back Country Byway System in 1989 (BLM 1992). The Lower Crooked River Backcountry Byway covers 43 miles of paved and gravel roads from the City of Prineville south to the convergence with State Highway 20.

BLM administers most of the land adjacent to the Chimney Rock section and completed a Management Plan and Environmental Assessment for the Wild and Scenic portion of the river in 1992 (BLM 1992). BLM also designated this reach as an Area of Critical Environmental Concern (BLM 1988), and it is a State Scenic Highway.

At the upstream end, the reservoir itself is more riverine in character, flowing through the center of a wide, gently sloping valley (Figure 3.8-2). Notable natural visual features include vertical basalt outcroppings, a rocky island, and several side canyons.



Figure 3.8-2: The upper Crooked River and surrounding wetlands near Old Field at low pool.

The study area north of the reservoir is within the John Day formation, while combinations of the John Day and Clarno formations are south of the reservoir. These formations consist of gently warped beds of fine-grained volcanic tuff and dense lava flows (Reclamation 1992). These features manifest as sloping bands of striated outcrops and escarpments of vertically fractured, columnar basalt. The most visually dramatic rock formations line the steep walls of the Crooked River canyon near the Big Bend Campground (Figure 3.8-1). Another visually prominent feature is a ridge of tooth-like outcrops (Figure 3.8-3) protruding from a ridge visible on both sides of the reservoir from Antelope Creek.

The shores of Prineville Reservoir are vegetated with a variety of plant types typical of central Oregon. These include woodlands, savanna, and shrub-steppe areas. Dominant plant species include western

juniper and big sagebrush, interspersed with an understory of bluebunch wheatgrass, cheatgrass, and needlegrass-bottlebrush squirreltail. Plant cover is relatively uniform, except where disturbed by juniper management activities, rock outcroppings, talus slopes, roads, and recreational infrastructure. With the exception of old rectangular clearcuts on adjacent BLM land resulting from juniper management, the vegetation appears fairly natural.



Figure 3.8-3: Prominent rock outcrop provides a dramatic visual feature.

Due to the lack of road access, viewing opportunities of Prineville Reservoir from public roads are limited. The only segment of state highway with a view of the water is a short section of SR 27 between the Bowman Dam and Powder House Cove. Portions along Juniper Canyon Road provide panoramic views of the reservoir between Antelope Creek and the Prineville Reservoir Resort (Figure 3.8-4), but the North Side Primitive Road is out of view of the water between Jasper Point and Cattle Guard; however, there are dramatic views of ridgetop rock formations to the north from this road. Other than the road to Roberts Bay and the recreation sites it accesses, there are no public views of the reservoir from the south shore. Views of the water from private property on the north side of the reservoir are generally limited to Bottero Park, Jasper Knolls, and Lakeview Cove Estates. On the south side of the reservoir a few private residences have good views of the reservoir. Generally, the best viewing opportunities are from the surface of the reservoir itself.

The vast majority of the area surrounding the reservoir has a natural character that appears unaltered by human activity. In general, the only development visible from the reservoir includes the access points, recreation facilities, Bowman Dam, and a few private homes. With the exception of Prineville State Park and the Prineville Reservoir Resort, the recreation sites have a relatively undeveloped appearance characterized by gravel or unimproved road and parking surfaces, portable toilets, and other minimal facilities. During the summer, these are most visually discernable from their surroundings due to the large numbers of RVs parked between the juniper trees. By contrast, both the Prineville State Park and Prineville Reservoir Resort have large areas of irrigated and mowed lawn, paved roads and parking, and permanent buildings. In addition, the Resort also operates a small marina and store that are particularly visible from the reservoir due to the Resort's prominent location at the tip of Jasper Peninsula. The only notable concentrations of private development easily visible from the reservoir are Bottero Park and Jasper Knolls, both located near the middle of the reservoir. Bottero Park is a small cluster of cottages and trailer pads on a small rise north of the Prineville Reservoir Resort. Due to the topography of the



Figure 3.8-4: Panoramic overlook of Prineville Reservoir as seen from Juniper Canyon Road.

site, this subdivision is visible from most recreation sites on both shores of the reservoir. The dominant small scale of these homes is visually consistent with the nearby resort and appropriate to its rural, park-like surroundings. Jasper Knolls is sited on the plateau overlooking the reservoir, but it is so far from the reservoir that it does not intrude visually to a noticeable degree.

When the reservoir is drawn down during the late summer through spring, the high water mark on the shoreline surrounding the reservoir is clearly evident. This zone of former inundation varies in height from the water's surface, up to a maximum of 3,235 feet above sea level, according to the degree of drawdown. At low pool (3,114 feet above sea level), the former reservoir bottom is exposed, revealing mudflats in shallow areas, such as in the SWA and Roberts Bay, and steep cobble benches in the lower reservoir such as Powder House Cove. In some locations, tree stumps become exposed at low pool.

3.8.1.2 Changes in the Visual Environment Since the 1992 RMP

Because limited information is available on the visual resources at Prineville Reservoir at the time of the 1992 RMP, it is difficult to accurately assess subsequent changes. Changes to visual resources resulting from management practices and physical developments built since 1992 include the following:

- **Juniper Management:** Many of the large, visually prominent juniper clearcuts in the vicinity of the Prineville Reservoir pre-date the 1992 RMP. This is because the BLM's juniper management practices changed in response to the BLM's 1989 Brothers/La Pine Resources Management Plan that elevated concerns over visual impacts to a required consideration by range managers. Specifically, Prineville Reservoir was included in the plan as an "area having high or sensitive visual quality." Several recreation sites and the reservoir's surface were classified as "key observation points" (KOPs) for monitoring of future changes to visual resources. BLM has implemented a number of practices to accomplish this objective, such as leaving more larger diameter trees, making irregular cut boundaries, and leaving strips and patches of remaining forest. The overall intended result is a more naturalistic vegetation cover pattern and less viewer objection (pers. comm., Swanson, 2002).

- **Jasper Point:** Jasper Point was used as a dispersed recreation site prior to the 1992 RMP. At the time of the 1992 RMP, rutting, gullying, and vehicular tracks were prominent landscape features. In response to heavy recreation demand combined with ongoing resource management problems, this site was subsequently developed as a medium density “fee-use” campground for a limited number of recreational vehicles and tents (Reclamation 1992). As a result of this action, the Jasper Point site has a far more orderly appearance, with the re-growth of some ground vegetation, clearly defined campsites, and new boat ramp, restroom, and other recreation facilities. The gullies, ruts, and vehicular tracks are no longer visually prominent.
- **ORV Trails:** The 1992 RMP described notable scenic problems resulting from unauthorized ORV use: “heavy dispersed recreation and off-road vehicle trail use in undeveloped areas has resulted in visual scars that will be very difficult for nature to repair. Often the most scenic and accessible lands within the reservoir area are the most heavily disturbed. In many locations, the vegetation has been heavily damaged or destroyed and the soils loosened or compacted to the point that wind and water erosion is common. Some of the most severe damage and abuse occur on the steepest slopes leading down to the reservoir. Off-road vehicle trails are a visible landscape feature due to the open nature of the juniper canopy and the preponderance of steeply sloped hillsides” (Reclamation 1992).

While unauthorized ORV use has continued at Prineville since the 1992 RMP, Reclamation and its partners (OPRD and ODFW) have had some success in reducing its extent and its impacts. As a result of more effective management and law enforcement practices, the most severe damage has moved from more accessible areas to less accessible areas, such as near the North Side Primitive Road and other dispersed recreation areas.

3.8.2 Environmental Consequences

3.8.2.1 Alternative A – No Action: Continuation of Existing Management Practices

The provision of information regarding appropriate waste management practices at remote recreation sites proposed, but not yet implemented, under this alternative could reduce litter, resulting in visual resource improvements. Likewise, the proposed designation of primitive sites would enhance management of recreational resources, which would likely improve visual conditions by reducing vegetation disturbance.

Improved fencing would eliminate livestock grazing in developed recreation areas and shoreline, riparian, and wetland habitats that would eliminate unsightly cow pies and hoof marks in areas of high recreation activity.

The addition of a 100-campsite, high-density campground expansion of the State Park along with a developed day use site at Antelope Creek would greatly alter the views of the north side of the reservoir from the central part of the reservoir and from south shore recreation sites around Roberts Bay. The areas of proposed development are currently juniper woodlands. Recreational development on these sites would greatly increase the proportion of the State Park relative to more natural landscape. Surrounding visual resources would be changed from a natural landscape to a developed campground.

Overall, Alternative A would likely improve views of the reservoir’s shoreline and remedy the disturbed appearance of recreational areas and dispersed campsites to some degree as well. While Alternative A

does not go as far as other alternatives to address some issues, none of the actions associated with this alternative would be anticipated to result in adverse visual impacts.

Mitigation and Residual Impacts [Alternative A]

No mitigation measures are proposed for Alternative A because no recommendations associated with this alternative are anticipated to result in adverse aesthetic impacts on visual resources in the RMP study area. BMPs listed in Chapter 5 (Environmental Commitments) are included for all alternatives.

Cumulative Impacts [Alternative A]

As discussed in Sections 3.9 (Land Use) and 3.10 (Socioeconomics) that follow, increased residential development around Prineville Reservoir is likely. The expanding population would likely increase development pressure on private lands near Prineville Reservoir, especially Lakeview Cove Estates that only recently acquired access and electricity. As new homes are constructed here, as well as on other developable lots within the Prineville Reservoir basin, the reservoir's visual character would change from nearly exclusively rural to rural with discernable suburban patches.

Increased recreation uses are likely to continue to put pressure on existing and proposed recreation facilities at Prineville Reservoir. This increasing activity would likely be visible from many parts of the RMP study area, potentially resulting in view degradation.

3.8.2.2 Alternative B – Natural Resources/Dispersed Recreation Balance

Alternative B includes a number of proactive measures to prevent visual degradation. These include improvements to livestock management, the implementation of BMPs while undertaking construction activities, and closure of informal roads to prevent soil erosion as well as to address the spread of noxious weeds, and improved juniper management. In addition, new roads would be routed to minimize the visual intrusion of cut-and-fill activities. Components of the BLM Visual Resource Management System would be implemented to maintain the area's existing visual quality under Alternative B. Reclamation would also coordinate with BLM on the road permit approval process to minimize visual impacts on BLM sites visible from Reclamation lands. Finally, new structures would be designed to OPRD design standards, improving the visual cohesiveness of the built environment. By proactively addressing these important visual resource concerns, Alternative B would likely result in positive visual resource impacts, benefiting visitors and adjacent residents.

The appearance of the recreation sites accessed from the North Side Primitive Road would remain visually the same as at present. Alternative B, however, proposes a number of modest developed improvements to recreation sites on the reservoir's south side. These include expanded parking at Powder House Cove, a new group day use area with shelter at Antelope Creek, and primitive campsites at Roberts Bay. As a result, the visual character of the south side would change to a moderate degree by the removal of vegetation and construction of parking lots and associated facilities. In general, these changes would be positive, similar to the improved conditions at Jasper Point since the 1992 RMP. Also, degradation of visual quality can be minimized through careful design and use of BLM's contrast rating evaluation system.

Mitigation and Residual Impacts [Alternative B]

No mitigation measures are proposed for Alternative B because the actions under this alternative do not have substantial adverse impacts on visual resources in the RMP study area. Also, degradation of visual quality can be minimized through careful design and use of BLM's contrast rating evaluation system. BMPs listed in Chapter 5 (Environmental Commitments) are included for all alternatives.

Cumulative Impacts [Alternative B]

The expanding population would likely increase development pressure on private lands near Prineville Reservoir, such as Lakeview Cove Estates. Construction of new homes on developable lots within the Prineville Reservoir basin would alter the reservoir's visual character from nearly exclusively rural to rural with discernable suburban patches.

Increased recreation uses are likely to continue to put pressure on existing and proposed recreation facilities at Prineville Reservoir. This increasing activity would likely be visible from many parts of the RMP study area, potentially resulting in degradation of certain views.

3.8.2.3 Alternative C – Natural Resource Protection/Formal Recreation Emphasis

In general, Alternative C includes the same or improved proactive measures to address and enhance visual resources as in Alternative B. Additional proactive measures include greater attention to juniper density management practices, along with close coordination with adjacent landowners and involvement in adjoining land use proposals where possible.

The proposed recreational development on the reservoir's south side under Alternative C would be substantially different than the other two alternatives, resulting in more noticeable changes to the appearance of Powder House Cove and Roberts Bay. Specifically, the proposed new Powder House Cove boat launch and associated parking would require a new road to be built parallel to the shore in a visually prominent location visible from SR 27 and the reservoir itself. This would likely require substantial grading work despite a provision to minimize the visual intrusion from cut/fill activities. However, potential visual impacts are likely to be offset by resolution of existing weekend parking along the shoulder of SR 27, which could eliminate the visual intrusion of vehicles along the roadway.

Proposed development at Roberts Bay, a site easily visible from the existing State Park, Prineville Reservoir Resort, and Juniper Canyon Road as well as virtually every private home near the reservoir, would greatly change the visual character of this site, especially during the latter phases of development. At that time, the largest single campground currently on the reservoir would be created. Visually prominent features would include a registration booth, picnic shelters, cabin cluster, overnight moorage, and employee housing. These features, especially if combined with paved roads, parking, and irrigated lawns, would convert this rustic but well-worn site to a large developed park. Whether this change would result in positive or negative visual impacts is largely subjective, depending on one's preference for naturalistic but cluttered appearance as currently exists, or more manicured but "designed" as proposed.

Mitigation and Residual Impacts [Alternative C]

No mitigation measures are proposed for Alternative C because the actions under this alternative do not have substantial adverse impacts on views and aesthetics in the RMP study area. BMPs listed in Chapter 5 (Environmental Commitments) are included for all alternatives.

Cumulative Impacts [Alternative C]

Cumulative impacts under Alternative C would be similar to those under Alternative A. Specifically, additional residential development and increased recreation use will change the area's overall rural character at Prineville Reservoir.

3.9 Land Use and Management

3.9.1 Affected Environment

This section addresses land use and land management practices within the RMP study area and in the general vicinity of Prineville Reservoir.

3.9.1.1 Overview of Reclamation Lands

Reclamation acquired a total of approximately 8,700 acres of the Crooked River valley to construct the Arthur R. Bowman Dam in 1961, creating Prineville Reservoir. This property was withdrawn from BLM holdings or purchased primarily from Joseph Bottero, a local landowner. Reclamation's holdings include 8,489 acres of land and water surface within the reservoir area, 280 acres within the Reclamation Zone located in the vicinity of Bowman Dam, and 340 acres of flowage easement lands along the Crooked River immediately above the reservoir. At full pool, the reservoir surface of 3,030 acres provides 43 miles of shoreline at Prineville Reservoir.

As shown on Figure 3.9-1, the upper end of the reservoir consisting of 3,160 acres of land and water has been designated a SWA, managed by ODFW primarily to provide for big game winter habitat as well as habitat for a variety of other wildlife. Recreation uses dominate the lower end of the reservoir, which is the site of two State Park facilities, a leased privately run resort, and several other scattered recreation sites. OPRD manages recreation resources at Prineville Reservoir on behalf of Reclamation.

Lower Reservoir

On March 16, 1961, shortly after the completion of Bowman Dam, Reclamation transferred recreation management responsibility to Crook County for most of the land surrounding the lower reservoir. Shortly thereafter, Crook County subleased 365 acres to the State of Oregon for what is now Prineville State Park. Under this license agreement (Contract 14-06-100-2124, dated June 27, 1961) between Crook County and the State of Oregon, the County agreed to license to the State a portion of the westerly half of the land surrounding Prineville Reservoir for the purpose of developing and maintaining a park. The agreement also required Crook County to construct a road to access the State Park. A follow-up license agreement dated June 27, 1961 between Crook County and the State of Oregon extended the above agreement for a 50-year term to expire March 16, 2011. This license required Crook County to construct a road from Combs Flat Road south to the State Park (North Side Primitive Road).

Crook County entered into a second license agreement on April 17, 1964 to further the development of recreational facilities at Prineville Reservoir. This 20-year agreement (with a 20-year renewal option) was with a private concessionaire to develop and operate the 190-acre Prineville Reservoir Resort. This license required resort facilities to be open daily for a minimum of 6 months per year. Minimum standards and structures permitted under the license included six 200 square foot cabins with running water and indoor sanitary facilities; a 1,200 square foot store; a commercial dock large enough for 20 boats; car and boat trailer parking; boat rental for at least twelve 14-foot boats; well and water filtration and storage; and a 20-unit trailer park with expansion for 20 additional trailers (specific recreation facilities are discussed in further detail in Section 3.7, Recreation). The resort was acquired by a second owner, who entered into a 20-year concession agreement with Reclamation on October 21, 1986. The resort concession was assigned a third time to the current owners on September 8, 1992. This

concession agreement was amended by Reclamation most recently on May 27, 1994 and will expire on December 31, 2005. Due to a number of physical site constraints, only a relatively small portion of the 190-acre resort area has been developed for recreation (pers. comm., Hawes, 2001).

In December 1985, Crook County terminated its license agreement with Reclamation. OPRD, which was previously a tenant of Crook County, renewed its lease directly with Reclamation for a 20-year term beginning May 5, 1987. This agreement recognized the State's ownership of existing recreation facilities built by the State. It also required the State to "make and enforce rules and regulations to protect plants, fish and wildlife; to preserve the scenic, scientific, aesthetic, historic and archeological resources of the area; and for the preservation of law and order in the interest of public safety" within the boundaries of the State Park.

OPRD's role was defined by the 1992 RMP to an on-site managing partner in conjunction with ODFW. Management of recreation at Prineville resulted in numerous facility improvements which are listed in Section 3.7 (Recreation) of this document.

On May 25, 1995, OPRD's lease at Prineville Reservoir was extended from the original 20-year term to a 50-year term starting from the date of the original agreement on May 5, 1987 and expiring on May 5, 2037. This lease also increased the area of OPRD management to include a large section of the Reservoir's north shore, extending from the County boat ramp to north of Jasper Point.

The current lease has been amended twice since 1995. The first amendment (Amendment No. 1, dated February 4, 1999), rectified a minor property boundary conflict between the Prineville State Park and the Prineville Reservoir Resort near Jasper Point. This amendment adjusted the boundary to include the parking lot for the Jasper Point boat ramp entirely within the State Park's area.

The second amendment (Amendment No. 2, dated May 4, 1999), provided for the continuing management, protection, and administration of all Reclamation land and water resources at Prineville Reservoir, except for those leased to the Prineville Reservoir Resort. Specific responsibilities include recreation management, protection, administration, and maintenance on lands under a wildlife management agreement with ODFW including managing garbage collection, sanitation, law enforcement, repairs, and similar services. This amendment provided up to 50 percent reimbursement funding from Reclamation to assist OPRD with operation and maintenance costs. (Specific service responsibilities are addressed in Section 3.11, Public Services and Utilities.)

Reclamation reserved administrative jurisdiction over a 280-acre portion of the reservoir in the vicinity of Bowman Dam referred to as "the Reclamation Zone." This area includes the dam itself, as well as the area immediately upstream and downstream of the dam.

Upper Reservoir

On March 14, 1962, Reclamation transferred management of the upper reservoir area to the Oregon Game Commission (now ODFW) to administer for fish and wildlife management. This 3,160-acre area referenced on the license agreement as "the State Zone" became the Prineville Reservoir SWA. This 50-

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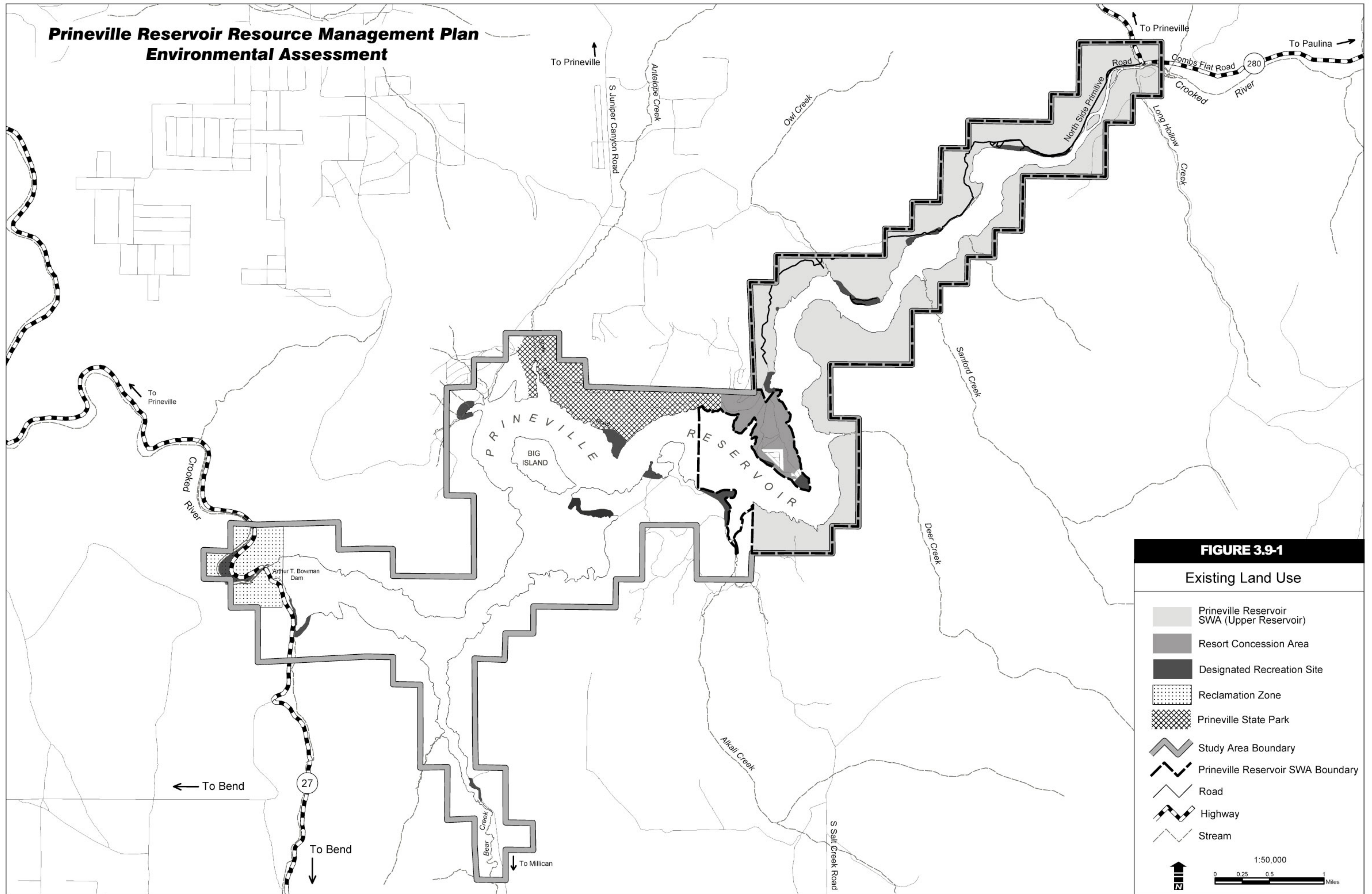


FIGURE 3.9-1

Existing Land Use

- Prineville Reservoir SWA (Upper Reservoir)
- Resort Concession Area
- Designated Recreation Site
- Reclamation Zone
- Prineville State Park
- Study Area Boundary
- Prineville Reservoir SWA Boundary
- Road
- Highway
- Stream

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0 0.25 0.5 1 Miles

↑ N

year agreement required the State to “make and enforce rules and regulations for the use of the area to protect the health and safety of persons using the area, to protect plants, fish and wildlife; to preserve the scenic, scientific, aesthetic, historic and archeological resources of the area; and for the preservation of law and order in the interest of public safety” within the boundaries of the State zone. Within this zone, the State also had authority to issue grazing permits where consistent with wildlife management needs and with Reclamation approval.

On March 4, 1976, the license agreement between ODFW and Reclamation was amended to adjust the boundary between the State and County zones to accommodate the development of a County park.

ODFW continues to manage wildlife resources in the SWA. Recreational use is permitted in this area, but ODFW’s primary management objective for the SWA is wildlife habitat protection and enhancement, primarily for waterfowl, upland game, and big game populations. Land management in this area has focused on increasing habitat for these game species. (More detail on habitat management in the SWA is addressed in Section 3.5, Wildlife).

3.9.1.2 Easements and Leases

Reclamation property at Prineville Reservoir is encumbered by the following right-of-way and utility easements and grazing leases:

Rights-of-Way

Over the years, Reclamation has issued a number of access easements to adjoining property owners. Most of these authorize pre-existing accesses to individual property owners and subdivisions. The most significant access allowance occurred October 23, 1958 in anticipation of the dam’s construction. To accommodate construction of Bowman Dam and Prineville Reservoir, Reclamation deeded an 82.74-acre strip of land to the State of Oregon Highway Commission for the relocation of Oregon State Highway No. 14 and No. 380 (Contract No. 14-06-100-1616). Reclamation also provided a perpetual road easement across the top of the dam. Reclamation had previously acquired State highway rights-of-way and compensated the State of Oregon for interference with existing County roads by Contract No. 14-06-100-1509 dated June 20, 1958. Prior to these agreements, SR 27 followed the Crooked River valley east until veering south up the Bear Creek canyon. Several other roads intersected with this highway within the area of the present reservoir including Alfalfa Road and a road that continued up the Crooked River valley, connecting with the North Side Primitive Road. The Juniper Canyon Road originally connected the City of Prineville with the Village of Roberts, but the section between the County boat ramp and Roberts Bay was inundated with the creation of the reservoir.

Use of existing roads across Reclamation land to access several private cabins on the south side of Prineville Reservoir has been authorized by similar documents. Standard language common to all these documents limited the government’s responsibility for road maintenance and prohibited construction of fences or gates to restrict access by easement holders. One relatively recent easement has been authorized to provide access to the Lakeview Cove Estates (June 23, 1999) subdivision over Reclamation land to South Juniper Canyon Road.

Telephone Easement

Reclamation provided for relocation of telephone facilities per Contract No. 14-06-100-1783 dated September 25, 1959. This agreement between Reclamation and the Bear Creek Telephone Company

provided for Reclamation to relocate a portion of the telephone line from the County boat ramp to Roberts Bay. The old line followed the County Road through the Crooked River valley. The new route follows the north shore of the reservoir before crossing the water in a buried cable and re-emerging near Roberts Bay West.

Power Line Easement

A contract between Reclamation and the Central Electric Cooperative (Contract No. 14-06-100-2105) dated March 13, 1961, provided for relocation of a power line. Reclamation provided Central Electric Cooperative a cash settlement for the construction, relocation, adjustment, and abandonment of the power line in areas inundated by the Prineville Reservoir itself and other parts of the study area closer to the City of Prineville. This work included removal of an existing 14.4 kilovolt (kV) power line located within the Crooked River valley and construction of a new section of 14.4 kV/24.9 kV line to serve two customers north of the County boat ramp.

Grazing

Reclamation has authorized BLM to manage grazing on Reclamation lands where compatible with Reclamation's current or planned use of any land area, and where not required for fish and wildlife management purposes or related uses. ODFW has the option of issuing grazing permits with approval from Reclamation when consistent with SWA management goals and objectives.

On Reclamation withdrawn or acquired land, permits issued by BLM shall be issued for BLM's normal permit or lease period, which has been 10 years, but shall include special stipulations as determined necessary for Reclamation to protect the land or facilities for Reclamation project purposes. When Reclamation determines that within 2 years its needs and uses will no longer be compatible with grazing, Reclamation will so notify BLM enabling it to notify the lessees and permittees and terminate the portions of the leases and/or permits on Reclamation lands in accordance with section 402 of the Federal Land Policy Management Act (FLPMA). Under emergency conditions, leases and permits may be terminated with shorter notice.

There are six permits issued for portions of 10 allotments that extend onto Reclamation lands around Prineville Reservoir (Table 3.9-1 and Figure 3.9-2). Grazing is restricted from the vicinity of the northern end of the reservoir by fencing to protect the SWA though there are several openings. On the south shore, the Taylor Butte and a portion of the Salt Creek and Dunham North allotments extend to the reservoir, allowing livestock direct access to the reservoir. On the north side, the upper portion of the Davis allotment extends along the shore of Prineville Reservoir from the dam to the County boat ramp (per. comm., Swanson, 2001).

During the 1992 RMP process, grazing management was identified as an issue needing immediate attention. Public comment emphasized that without careful livestock control and management, grazing at Prineville Reservoir is incompatible with wildlife habitat, recreation, and other resource values (Reclamation 1992).

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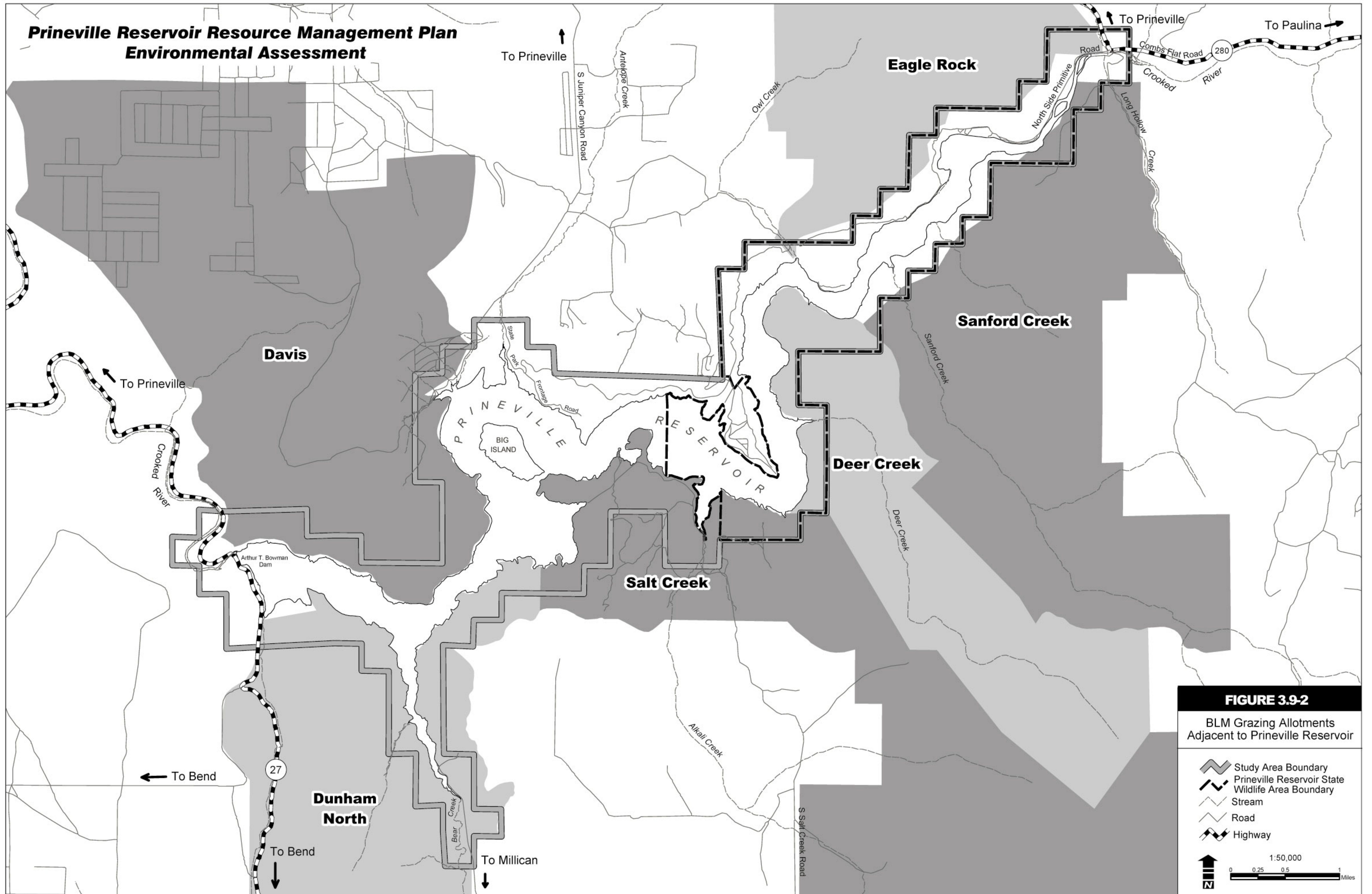


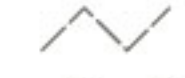




FIGURE 3.9-2
BLM Grazing Allotments
Adjacent to Prineville Reservoir

-  Study Area Boundary
-  Prineville Reservoir State Wildlife Area Boundary
-  Stream
-  Road
-  Highway

1:50,000
0 0.25 0.5 1 Miles




Table 3.9-1: BLM grazing allotments that overlap Reclamation lands at Prineville Reservoir.

Allotment	Total AUMs ¹	Term
Sanford Creek	370	3/01/1994 to 02/28/2008
Eagle Rock	155	3/01/1994 to 02/28/2008
Deer Creek	170	2/24/1997 to 12/31/2002
Salt Creek	1364	05/01/1997 to 12/31/2006
Dunham North	184	11/15/1999 to 02/28/2009
Davis	348	03/01/1995 to 02/28/2005
Carey ²	43	03/01/1998 to 02/28/2008

Source: BLM, Prineville District.

¹ AUM is Animal Unit Month.

² The Carey Allotment is not shown in Figure 3.9-2; the GIS data were not available. This allotment is located between the Eagle Rock and Davis Allotments.

Note: The pastures in these allotments can be grazed year-round, but BLM manages them according to site-specific conditions. BLM restricts grazing from early spring through late fall on those pastures that overlap Reclamation land to avoid conflicts with recreation use.

The following actions regarding grazing management were identified under the 1992 RMP:

- Grazing will be eliminated from all developed/designated recreation areas by fencing.
- Grazing use within the northeast and southeast portions of the SWA not administered by BLM will continue to be determined annually by ODFW and Reclamation.
- Grazing on Reclamation administered lands will be evaluated during development of the Prineville Reservoir Habitat and Wildlife Management Plan. Any changes in grazing use will be made in close coordination among Reclamation, BLM, ODFW, and affected parties. Emphasis will be placed in keeping livestock use away from reservoir shoreline, wetland, and riparian areas. Methods to accomplish this, including the development of watering locations in upland areas, will be considered.
- Reclamation will actively participate in the revision of BLM allotment management plans affecting Reclamation lands at Prineville Reservoir. Reclamation’s guidelines for these efforts will be to preserve, protect, and enhance the natural resource values at Prineville Reservoir.

These actions have been met with limited success. The SWA was fenced to eliminate trespass livestock, but a Habitat and Wildlife Management Plan has not yet been prepared.

3.9.1.3 Adjacent Land Uses

Most lands surrounding Reclamation's land at Prineville Reservoir are managed by BLM for multiple uses, including grazing (Figure 3.9-3). Privately held lands to the north and west of the reservoir are zoned Rural Residential by Crook County, which allows housing development at densities up to 1 dwelling unit per 5 acres (pers. comm., Moore, 2001). On the south side, the County has zoned most of the land Park Reserve, which permits agriculture, park uses, and residential development (1 dwelling unit) on parcels 20 acres and larger. Land on the northeast end of the reservoir is zoned Exclusive Farm Use, which limits land use to agriculture, agricultural businesses, and homes at densities limited to 1 dwelling unit per 80 acres (pers. comm., Moore, 2001).

Existing development within the Prineville Reservoir drainage is located in three older subdivisions (Bottero Park, Jasper Knolls, and Lakeview Cove Estates), as well as four large plats on the south side of the reservoir and a few scattered houses. Bottero Park and Jasper Knolls have electrical and telephone service, and an overhead electric line was installed to Lakeview Cove Estates in 2000 with sufficient power capacity for approximately 31 lots (pers. comm., McDevitt, 2001). In general, all of these developments rely on wells and septic systems for water supply and sewage treatment. Factors limiting development include limited road access, strict County septic approval requirements, and lack of utility service (pers. comm., Moore, 2001).

Bottero Park is a privately owned inholding of 11 acres. This private subdivision, which was platted in 1963 by the former land owner of portions of the Prineville Reservoir site, is centrally located on a peninsula in the Prineville Reservoir. Over the years, most of the 15 homes on 51 lots have gradually been converted from trailer platforms and modest vacation cabins to more substantial homes, a number of which are occupied year round (Crook County 1980).

Jasper Knolls is a 44-acre subdivision of 86 lots which overlooks the reservoir near Jasper Point. This subdivision was platted in 1964 and contains a mix of approximately 49 summer and year-round residences. In addition, three additional homesites are located behind Jasper Knolls subdivision, of which only one is developed (pers. comm., McDevitt, 2001). Access to Jasper Knolls is provided via an easement over Reclamation land to South Juniper Canyon Road.

Lakeview Cove Estates, a 105-lot subdivision, is located on nearly 55 acres on a hillside above the County boat ramp area overlooking the reservoir. This plat was filed with Crook County in 1966, but little development activity occurred due to lack of road access (pers. comm., Seely, 2001). On June 23, 1999, the property owners acquired an access easement across Reclamation land for a road to connect these homesites to the County boat ramp access road. This access also includes overhead electric line installed by Central Electric Cooperative in 2000 for approximately 31 lots (pers. comm., McDevitt, 2001), which would facilitate limited future residential development if water and other services could be obtained.

According to the County Road Map, the next closest existing subdivision is Idle Way Acres, a 134-lot subdivision about 1 mile north of Reclamation's property easily accessed by Juniper Canyon Road. Other individual homes are scattered around the area, several of which are located on the south side of the reservoir. The closest of these are three houses located on the slope above Roberts Bay.

3.9.2 Environmental Consequences

3.9.2.1 Alternative A – No Action: Continuation of Existing Management Practices

The 1992 RMP recommended that a Grazing Management Plan for Reclamation lands be developed to ensure the protection of sensitive resources. This program was never developed or implemented. Under Alternative A, Reclamation would complete a Grazing Management Plan for Prineville Reservoir lands. This would increase the level of responsible land management and preservation of resource values. Any restrictions of grazing on Reclamation land would alter small areas of BLM grazing allotments around sensitive resource and recreation areas. The area of the allotments affected would be small in proportion to the size of these allotments.

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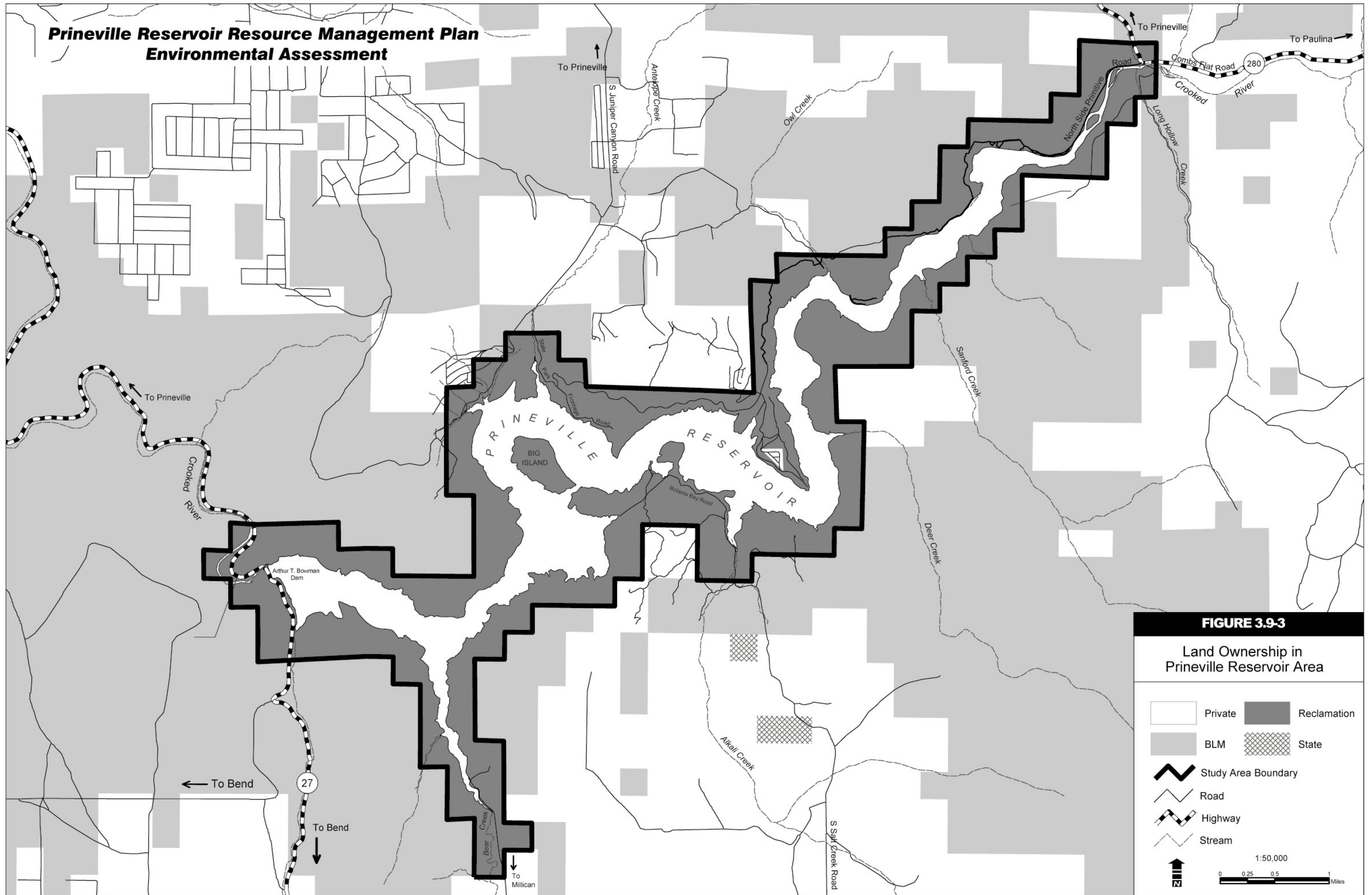


FIGURE 3.9-3

**Land Ownership in
Prineville Reservoir Area**

- Private
- BLM
- Reclamation
- State
- Study Area Boundary
- Road
- Highway
- Stream

1:50,000
0 0.25 0.5 1 Miles

Management of the SWA would continue to emphasize habitat and wildlife values, and the development of a Habitat and Wildlife Management Plan would ensure responsible management of these resources. Continued coordination with OPRD and ODFW through their respective leases with Reclamation would provide continued management of recreation and fish and wildlife on Reclamation lands. Designation of campsites in the SWA and Roberts Bay East would provide for a more efficient management of the recreation and natural resource values of the area and would reduce current dispersed land use patterns that adversely affect natural resources. In general, Alternative A would have greater benefits to land management than Alternative B, but less than those of Alternative C.

Mitigation and Residual Impacts [Alternative A]

No mitigation measures are proposed for Alternative A because the actions under this alternative do not have substantial adverse impacts on land use and management in the RMP study area. BMPs listed in Chapter 5 (Environmental Commitments) are included for all alternatives. The residual impacts are previously discussed in more detail in the above narrative.

Cumulative Impacts [Alternative A]

As discussed in Section 3.10 (Socioeconomics), the regional population is expected to grow for the foreseeable future. The expanding population would likely increase development pressure on private lands near Prineville Reservoir, especially Lakeview Cove Estates that only recently acquired access and electricity. As new homes are constructed here, and on other developable lots within the Prineville Reservoir basin, the reservoir's character would become increasingly suburban with resulting impacts to land uses at Prineville Reservoir.

3.9.2.2 Alternative B – Natural Resources/Dispersed Recreation Balance

Land use impacts under Alternative B would be very similar to those anticipated under Alternative A. No negative impacts are expected, and minor positive impacts associated with improvements to livestock management and increased enforcement of illegal ORV use would reduce misuse of land resources.

Mitigation and Residual Impacts [Alternative B]

No mitigation measures are proposed for Alternative B because the actions under this alternative do not have adverse or residual impacts on land use within the general vicinity of the RMP study area.

Cumulative Impacts [Alternative B]

Cumulative impacts under Alternative B would be similar to those under Alternative A. Regional population growth is likely to contribute to local development pressures.

3.9.2.3 Alternative C – Natural Resource Protection/Formal Recreation Emphasis (Preferred Alternative)

In general, Alternative C proposes to increase developed capacity for recreational uses at Prineville Reservoir as a way to accommodate existing and projected use while protecting resources. This approach would have mostly positive land use benefits by concentrating recreational activity in developed and managed recreation sites and by adding new facilities and by potentially limiting visitor use to more manageable levels. Although these impacts would be beneficial, this alternative would alter

the existing character of the area around Prineville Reservoir more than either of the other two alternatives.

Substantially expanded recreational facilities may also have secondary land use impacts, resulting from increased visibility of the Prineville Reservoir area that would likely result from this development especially if OPRD promotes the expanded facilities as a way to recoup its investments. Another potential secondary impact could result from service improvements to the south side of the reservoir. If electricity is developed along Roberts Bay Road at a future time, this could stimulate potential residential and second home development on private land outside Reclamation property.

Mitigation and Residual Impacts [Alternative C]

No mitigation measures are proposed for Alternative C because the actions under this alternative do not have significant adverse impacts on land use within the general vicinity of the RMP study area. Residual impacts include increased development pressure possibly resulting from OPRD-generated publicity and by public service upgrades to the south side of the reservoir such as road improvements and electrical service.

Cumulative Impacts [Alternative C]

Cumulative impacts associated with increased recreation use and regional population growth under Alternative C would be similar to those under Alternative A. Increased recreational development proposed under Alternative C would be more consistent with the changing character of private lands surrounding Prineville Reservoir as residential development expands in nearby subdivisions.

3.10 Socioeconomics

This section addresses impacts associated with all three alternatives on socioeconomic issues in the vicinity of Reclamation-owned lands bordering Prineville Reservoir.

3.10.1 Affected Environment

Prineville Reservoir is located in Crook County, Oregon. Crook County’s economy and demographics are profiled below. The data shown in Tables 3.10-1 through 3.10-5 were gathered from various sources and may vary in some instances.

3.10.1.1 Economy and Employment

Manufacturing and trade (primarily wood products and tires) and agriculture (farming and ranching) are the principal employment sources for most families in Crook County. The area’s best-known and largest employer is Les Schwab Tires, headquartered in Prineville. As shown in Table 3.10-1, all other large manufacturing sector employers produce wood products.

Table 3.10-1: Five largest employers, public and private, as of September 2000.

Employer—Product/Service	Number of Employees
Les Schwab Tire Co—Tires	833
Clear Pine Moldings, Inc.—Millwork, Wood Products	549
American Pine Products—Pine Moldings	425
Ochoco Lumber Company—Lumber Products	212
Pioneer Cust Stock—Millwork	120

Source: Oregon Economic and Community Development Department website; accessed 4/10/01

The principal irrigated crops are small grains, alfalfa, potatoes, and peppermint. Agricultural use of non-irrigated lands includes dryland wheat and livestock grazing. Approximately 48 percent of the County's land area is farm land (Prineville-Crook County Chamber of Commerce 2001).

Local economic health has been gradually rebounding after years of decline in the timber industry, with manufacturing and the service sectors playing an increasingly important role in the local economy. Leading economic indicators in Crook County are summarized in Table 3.10-2.

3.10.1.2 Population and Demographics

Crook County is a sparsely populated rural county of 2,991 square miles, with an average population density of 6 persons per square mile (Oregon Economic and Community Development Department website). Population growth (See Table 3.10-3) has increased slightly faster in the City of Prineville than Crook County as a whole, in part because Prineville’s housing market is relatively affordable in comparison to other areas in the region. Crook County’s population growth is expected to slow slightly in the future, with long-term growth at between 15 and 18 percent per decade until 2040, as shown in Table 3.10-4.

The City of Prineville has become increasingly attractive to retirees interested in central Oregon’s climate and amenities, as well as to commuters employed in nearby Bend and Redmond (pers. comm., Moore, 2001). Overall, the central Oregon area around the City of Bend is the fastest growing area in the state. It continues to attract small high-tech companies, the resort industry, and retirees (McMahon 2001). Among cities in Oregon with a population of greater than 10,000 in 1990, Bend was the fastest

growing area, increasing by 160 percent during the decade and reaching 53,000 in 2000. Ranked by the amount of population change during the decade, Bend ranked third (with 33,000) behind Portland and Hillsboro. Deschutes County, where Bend is located, has also experienced extremely rapid population growth. In the period between 1990 and 2000, Deschutes County had the highest percent change in population (53.9 percent) in the entire state (Center for Population Research & Census website).

Racial diversity is relatively limited in Crook County (see Table 3.10-5). Approximately 93 percent of the population is white. Latinos are the only minority group comprising more than 5 percent of the population. Other than Latinos, which more than doubled in population since the last census, Crook County appears to be relatively stable in terms of racial demographics.

Table 3.10-2: Crook County economic indicators.

Economic Indicators	2000
Population	19,182
Labor Force	8,010
Total Employment	7,340
Unemployment	640
Unemployment Rate	8.4
Non-Farm Payroll Employment	6,350
Total Covered Employment	6,336
Total Covered Payroll (\$ thousands)	167,955
Average Annual Payroll Per Employee	26,508
Number of Business Units	391
Total Personal Income (\$ millions)	20,225
Annual Per Capita Personal Income	16,899
Assessed Value of Property (\$ millions)	1,038
Residential Construction	
Building Permits	205
Value (\$ thousands)	24,926
Travel Expenditures (\$ millions)	23,400
Travel-Related Employment	500

Sources: Center for Population Research & Census website; U.S. Census Bureau website; Bureau of Economic Analysis website; Oregon Tourism Commission website; Oregon Department of Revenue website; Oregon Economic and Community Development Department website.

Table 3.10-3: Local and regional population growth.

	1970	1980	1990	1998	1999	2000	Change 1990-2000
City of Prineville	4,101	5,276	5,355	6,920	7,255	7,356	37.4%
Crook County	9,985	13,091	14,111	16,650	16,800	19,182	35.9%

Sources: U.S. Census Bureau website; Center for Population Research and Census website; Oregon Economic and Community Development Department website; Office of Economic Analysis website.

Table 3.10-4: Long-term Crook County population and non-agricultural employment forecast.

Crook County	2000	2010	2020	2030	2040	Change 2000-2040
Population	17,168	20,215	23,678	27,567	31,752	84.9%
Employment	6,834	8,160	9,266	10,634	12,264	79.5%

Source: Office of Economic Analysis website.

Table 3.10-5: 2000 Crook County population by race.

Race	1990		2000	
	Population	Percentage	Population	Percentage
White	13,637	97	17,830	92.9
African American	11	0.08	8	0.04
Indian/Alaska Native	221	1.6	250	1.3
Asian	47	0.3	82	0.4
Hawaiian/Pacific Islander	N/A	N/A	6	0.03
Other	195	1.4	731	3.81
Two or More Races	N/A	N/A	275	1.39
Latino	338	2.4	1,082	5.6

Source: 1990, 2000 Census

Note: The percentage totals are greater than 100% because Latinos (an ethnicity) are also counted as African American or White (races) depending on how they identify themselves.

3.10.2 Environmental Consequences

None of the alternatives are expected to directly affect local population or income to a substantial degree. All three of the alternatives would increase fencing, which would limit the area of existing grazing leases to a minor degree, but this reduction would not be significant relative to the area of available grazing land in the region nor the amount of grazing land available per each allotment. A minor positive socioeconomic effect under Alternative C would be a small increase in seasonal employment by OPRD. If implemented, any of the three alternatives would improve the amenity value of Prineville Reservoir, making the region more desirable in and of itself; however, this change would not likely result in any measurable change to local population.

The primary financial implications for Crook County are related to law enforcement. This is because of the costs to Crook County related to patrolling the study area. These costs have historically been offset to some degree through financial assistance provided by Reclamation. As discussed in Section 3.11, the proposed level of law enforcement varies to some degree among the alternatives.

Alternative A proposes continued enforcement by the Crook County Sheriff’s office and expanding resources as needed.

Proposed law enforcement under Alternative B would increase enforcement of ORV access rules but would otherwise be identical to the No Action Alternative, resulting in similar financial implications for Crook County. However, the lack of environmental controls proposed under Alternative B may actually result in an equivalent or greater need for local law enforcement; thus, Alternative B may ultimately be the most costly.

Alternative C proposes working with Crook County to establish additional ordinances to improve enforcement capability on Reclamation lands in addition to continuing existing enforcement practices. As long as Reclamation funding keeps pace with expanded law enforcement capability, no additional financial burdens should be expected by Crook County. Alternative C effectively sets visitor limits by defining campsites and use areas, and by providing a management presence particularly at Roberts Bay. This should reduce the law enforcement burden to the County more than Alternatives A or B.

All three alternatives include improvements that should enhance tourism-related revenues for the local economy, although it is difficult to accurately project a correlation between the three alternatives and differing levels of revenue.

Mitigation and Residual Impacts

No mitigation measures other than continuation of appropriate levels of support for law enforcement are proposed since none of the alternatives are expected to directly affect local population or income to a substantial degree. No significant residual impacts related to socioeconomics related to the alternatives are anticipated.

Cumulative Impacts

Increased recreation use and regional population growth are likely to continue to put pressure on existing and proposed recreation facilities at Prineville Reservoir.

Projected population growth in Prineville and Crook County, as well as Deschutes County, would continue to place pressure on recreation and wildlife resources at and around Prineville Reservoir as a growing population of area residents seeks nearby recreational amenities. As discussed in Section 3.9 (Land Use), privately owned land near the reservoir would be subject to increasing development pressure.

3.11 Public Services and Utilities

This section discusses relevant public services and utilities at Prineville Reservoir and in the surrounding area.

3.11.1 Affected Environment

3.11.1.1 Emergency Fire Suppression Services

Under the terms of its lease with Reclamation (as amended May 4, 1999), OPRD is the lead on-site agency in all emergency and fire suppression activities on Reclamation lands administered by ORPD, within the limits and responsibilities outlined in the Prineville State Park Emergency Action Plan. In practice, BLM is the first responder for wildland fires on lands owned and managed by Reclamation at Prineville Reservoir. Prineville Reservoir and the public lands in its immediate vicinity are considered by BLM to be an area of high value to receive high priority for fire management and suppression (Reclamation 1992). OPRD maintains a small pumper truck to fight structural fires at Prineville State Park (pers. comm., Crawford, 2000). Wildland fire protection in rural areas is coordinated with BLM and the U.S. Forest Service.

Responsibility for fires on Prineville State Park lands, lands leased by the Prineville Reservoir Resort, or those on private property comes under the jurisdiction of the Crook County Rural Fire District #1. Crook County Rural Fire District #1 was created by a merger between the Prineville Fire Department and Crook County Rural Fire Department's Zone #2 on July 1, 2001. Following this merger, the boundaries of the Fire District were extended from Reclamation's property line to the Prineville Reservoir Resort, including Prineville State Park, Bottero Park, and Jasper Knolls. Crook County Rural Fire District #1 provides fire protection, ambulance service, and emergency medical technicians to an area covering approximately 54 square miles. Crook County Rural Fire District #1 provides fire protection service to the community from a main station located at 500 N Belknap Street in downtown Prineville. This station is equipped with four type 1 fire trucks, two tenders, three brush trucks, and three medical units. The department has six paid and 65 volunteer firefighters. The Crook County Rural Fire District #1 plans to build a new fire substation on land it acquired in Juniper Canyon. When completed in 2002 or 2003, this new satellite station would be equipped with a Class A fire truck, a brush truck, a tender (3,000-gallon tank truck), and a medical unit. This location, which is considerably closer to the north side of the Prineville Reservoir than the current fire station, is expected to cut response time to the north side of the reservoir by approximately 50 percent (pers. comm., Schnorr, 2001).

3.11.1.2 Emergency Medical Services

Prineville Reservoir is located within the Crook County Rural Fire District #1's Ambulance Service Area. The Crook County Rural Fire District #1 operates three ambulances. Emergency medical response time is approximately 10 to 15 minutes to Prineville State Park and other destinations on the reservoir's north side. Destinations on the south side such as Powder House Cove are estimated to require 30 to 45 minutes to reach by ambulance and potentially longer for Roberts Bay. On average, camping and water skiing accidents result in approximately one or two visits to the reservoir by the ambulance per month during the summer season (pers. comm., Schnorr, 2001). The nearest hospital is Pioneer Memorial Hospital, a non-profit, 35-bed, acute care medical facility providing full medical

services to the Prineville-Crook County area (Oregon Economic and Community Development Department website). Emergency air transportation is available from Life Flight in Bend, Oregon. Response time to Prineville Reservoir is approximately 15 minutes to any point along the reservoir.

3.11.1.3 Law Enforcement

The Crook County Sheriff's Office is the lead law enforcement agency at Prineville Reservoir, with patrol services provided on shore under contract with Reclamation. The Crook County Sheriff's Marine Patrol enforces boating regulations under contract to the Oregon State Marine Board. OPRD and Oregon State Police also provide limited enforcement services (pers. comm., Hensley, 2001).

Reclamation has contracted with the Crook County Sheriff's Department on an annual basis since 1986 to provide supplemental surveillance and law enforcement services at the reservoir. The current law enforcement contract provides for the Sheriff's Office to perform year-round response to specific complaints, along with limited preventive patrol. Law enforcement is stepped up at Prineville Reservoir from Memorial Day through Labor Day of each year with the addition of two seasonal deputies who are each assigned to a 40-hour patrol week at Prineville Reservoir. Patrol time is determined for each seasonal contract. Sheriff's deputies patrol on flexible schedules to meet the requirements of seasonal demands.

The primary emphasis of these vehicle and foot patrols is to enforce County Ordinance No. 101, which amended County Ordinance No. 34 on April 12, 1975. Both local laws were initiated in response to complaints about ORVs, vandalism, the use of firearms, domestic disturbances, alcohol-related incidents, and other violations at Prineville Reservoir. These regulations specifically address vehicles, vehicle use, and parking; noise and quiet hours; weapons and hunting; fires; pets; protection of wood and other plant life; buildings, signs, and recreation area equipment; waste disposal; cleaning fish and dishes; and camping (the full text of County Ordinance No. 101 is included as Appendix G). The Crook County Sheriff also enforces Oregon State laws.

In addition, the County's marine deputies patrol the reservoir by boat from April to September, with greatest intensity between Memorial Day and Labor Day. Two boats patrol the reservoir, especially on weekends and holidays. Watercraft safety is a major concern of the marine patrols who enforce speed and other regulations on behalf of the Oregon State Marine Board. Currently, the only areas of the reservoir posted for 5 mph boating are Powder House Cove, the straits between the big island and Juniper Point, Roberts Bay, and the portion of the reservoir north of Owl Creek. Boat speed is also restricted to 5 mph within 200 feet from the shore and in front of the State Park, where 3 mph is the preferred speed limit. Boat speed is limited to 10 mph within 100 feet of another vessel (pers. comm., Hensley, 2001).

OPRD has citation authority to enforce the Oregon Administrative Rules within Reclamation's property. In addition to hunting and fishing enforcement by the Crook County Sheriff's Office, the Oregon State Police Department's game officers enforce hunting and fishing regulations on and around the reservoir, as well as in the back country (pers. comm., Hensley, 2001). Oregon State Police also provide random patrols throughout the year to assist in unauthorized ORV use enforcement and trespass issues.

During the summer season, Prineville Reservoir is a major law enforcement focus by Crook County. Specific "hot spots" include less-regulated sites such as Roberts Bay and areas accessed by the North Side Primitive Road. The Powder House Cove area has also become an area of increased law

enforcement due to unsafe parking on Highway 27, watercraft crowding near the makeshift boat ramp, and other conflicts resulting from increased use by visitors from the Bend area (pers. comm., Hensley, 2001).

3.11.1.4 Water Supply

Prineville State Park draws groundwater from three wells for domestic and irrigation uses. One well serves as the primary water source with the remaining two providing backup. Groundwater is pumped to a 20,000 gallon concrete storage tank that supplies restrooms, spigots, and campsite hookups with gravity-fed potable water. This tank is scheduled to be replaced in 2003 with a 100,000 gallon steel storage tank. Capacity of this system is estimated at 23,500 gallons per day. Park facilities at Jasper Point are served by a separate well (pers. comm., Skavlan, 2001). Jasper Point also depends on groundwater for domestic purposes and fire protection. This campsite is supplied by one well and a 20,000 gallon water tank that supplies all campsites with water through gravity-fed lines, capable of processing 500 gallons per day (pers. comm., Crawford, 2001). This system was upgraded in 2001 with the addition of a pressure regulating pump.

Prineville Reservoir Resort operates three wells in rotation which pump water to a 9,000 gallon storage cistern. Stored water is fed by gravity to water users, including the motel, two private homes, the store/café, and spigots at the campsites and marina. Resort owners installed a new well in 2000 and replaced a pump motor the following year. This system does not provide adequate water flow during the peak season in dry years. At these times, the resort re-fills the cistern with fresh water trucked in from Prineville. Water conservation measures in the works or planned include low-flow showerheads and card showers to prevent unauthorized use. Bottero Park and Jasper Knolls also depend on well-supplied groundwater (pers. comm., Hawes, 2001).

3.11.1.5 Wastewater Treatment

Sewage generated by campground restrooms and campground hookups at Prineville State Park is treated by septic tank and leaching field systems. Sewage treatment at Jasper Point is limited to a vault toilet. ORPD installed a dump station for RV use in June 2002. Recreation sites such as Owl Creek, Cattle Guard, Old Field, Roberts Bay, and Big Bend—as well as the County boat ramp and Powder House Cove—have portable or vault toilets maintained by a private vendor under contract to ORPD (pers. comm., Skavlan, 2001). The Prineville Reservoir Resort has separate septic systems to treat wastewater generated by two private houses, the store/café, motel, and two restrooms. Wastes discharged at the RV dump station are stored in a large holding tank emptied by a commercial hauler one to two times each season (pers. comm., Hawes, 2001). A floating restroom was put in place in Juniper Bay for seasonal use by boaters during the 2001 and 2002 recreation season (August-October 2001 and April-October 15, 2002).

3.11.1.6 Solid Waste

ORPD maintenance crews at Prineville State Park collect trash from receptacles throughout the park and Jasper Point on an as-needed basis. During peak activity periods, this can be up to several times per day. The trash truck is emptied on a weekly basis, or more frequently if necessary, at the local landfill near Prineville. Trash receptacles at recreation sites such as Owl Creek, Cattle Guard, Old Field, Roberts Bay, and Big Bend—as well as the County boat ramp, Powder House Cove, and Bear Creek—are emptied by private vendor under contract to ORPD (pers. comm., Skavlan, 2001).

3.11.1.7 Gas

There is no natural gas service available in the vicinity of Prineville Reservoir. Both bottled propane and gasoline are stored and sold at the Prineville Reservoir Resort.

3.11.1.8 Electrical

Central Electric Cooperative provides 30 amp service to most campsites at Prineville State Park and Jasper Point. Campsites at Prineville Reservoir Resort have 20 amp service. Electrical service is also provided to facilities at Bowman Dam. Electricity is measured by seven meters in the State Park and three meters in Jasper Point. Bottero Park and Prineville Reservoir Resort have a combined total of 29 electric meters (pers. comm., McDevitt, 2001).

3.11.1.9 Telecommunications

Prineville State Park and Jasper Point each has one payphone, with service provided by Qwest. Administration facilities at Prineville State Park are served by nine lines. Mobile telephone service is limited at Prineville State Park for some service providers, especially digital phones. Most cellular phone customers report better coverage at Jasper Point (pers. comm., Skavlan, 2001). Two Qwest pay phones are located at the Prineville Reservoir Resort, which also maintains two business lines and two personal lines (pers. comm. Hawes, 2001). A repeater tower has been proposed to assist emergency, law enforcement, and operations communications. A tentative site for this tower is the south shore of the reservoir between Powder House Cove and the Bear Creek Arm.

3.11.2 Environmental Consequences

3.11.2.1 Alternative A – No Action: Continuation of Existing Management Practices

Current fire prevention and law enforcement practices would continue under Alternative A. Results of the development of Jasper Point would indicate that formalized recreational site development proposed under this alternative for Roberts Bay East would likely improve behavior by visitors, resulting in positive benefits to the south shore areas.

Utilities would remain relatively unchanged under Alternative A, although potable water is proposed for Roberts Bay. Based on the history of water shortages reported by the Prineville Reservoir Resort, this new water demand could also experience and possibly contribute to supply shortages during the peak use dry period. This could potentially affect recreation users at Roberts Bay.

Information signage would be added under Alternative A to inform visitors about the pack-in/pack-out policy for solid waste, which would likely reduce some litter problems in remote sites.

Mitigation and Residual Impacts [Alternative A]

To prevent possible utility impacts, such as over-consumption of water or excessive demands on wastewater treatment facilities during the dry summer months, water saving technology would be used in any new recreation or support facility development where feasible. If this approach does not prove successful, possible residual impacts include potential water shortages resulting from new facilities at Roberts Bay.

Cumulative Impacts [Alternative A]

Projected regional population growth and resulting local development and increased visitation would have a long-term effect on public service providers and resources. Specifically, this growth will add to the response demands of local fire suppression services, emergency medical, and law enforcement. Residential development within the Prineville Reservoir basin and its effect on water quality and supply are of particular concern, especially for Jasper Knolls and Bottero Park due to their proximity to OPRD-managed public recreational facilities. The outcome of the PRRS would not affect public services or utilities associated with Prineville Reservoir.

3.11.2.2 Alternative B – Natural Resources/Dispersed Recreation Balance

Under Alternative B, OPRD would develop an agreement with Crook County Rural Fire District #1 for structural fire protection, which could result in positive benefits for both agencies.

Vehicle access rule enforcement would be increased under Alternative B. In addition, signage and additional barriers will be installed to control ORV use.

Utilities would remain relatively unchanged under Alternative B, although potable water is proposed for Roberts Bay. This would create new demands on the local groundwater supply and may contribute to supply shortages during the peak use dry period and would adversely affect recreationists.

Information signage would be added under Alternative B to inform visitors about the pack-in/pack-out policy for garbage, which would likely reduce some litter problems in remote sites.

Mitigation and Residual Impacts [Alternative B]

Mitigation measures proposed for Alternative B consist of the use of water-saving technology, similar to those proposed under Alternative A. Nevertheless, water shortages occurring at times of peak demand may still occur as residual impacts.

Cumulative Impacts [Alternative B]

Cumulative impacts associated with increased recreation use and regional population growth under Alternative B would be similar to those under Alternative A by adding to demands on local public service providers and increasing resource pressures.

3.11.2.3 Alternative C – Natural Resource Protection/Formal Recreation Emphasis

In addition to the interagency structural fire protection agreement between OPRD and the Crook County Rural Fire District #1, Reclamation would cooperate with neighboring counties on a wildland fire prevention program. In addition, fire prevention and closure information would be posted at recreation sites. Emergency communications capabilities would also be improved under this alternative through cooperation with other interested agencies and parties, resulting in positive public service impacts.

In association with the greater emphasis on developed recreation under Alternative C, enforcement funding would be continued and expanded as necessary. Additional County ordinances may be established through cooperation with Crook County to improve enforcement on Reclamation lands, and established Reclamation regulations would be enforced. As a result of these measures, benefits from

better and more coordinated enforcement of laws and regulations could be expected under Alternative C. Nevertheless, local law enforcement capabilities are limited. Additional enforcement responsibilities, such as more restrictive no-wake zones and use prohibitions, may have staffing or level of service impacts for local law enforcement entities. Alternative C effectively sets visitor use limits by defining campsites and use areas and by providing a management presence particularly at Roberts Bay. This should reduce the law enforcement burden to the County more than Alternatives A or B.

New recreational facility development proposed under Alternative C would result in proportional increases in demand for water supplies and wastewater treatment. Specifically, new employee housing and rental cabins proposed for the expanded State Park area, along with new flush toilets, showers, irrigation, and employee housing at Roberts Bay, would require substantial new and expanded utility capacity.

Alternative C includes improved visitor communications, such as information signage and park brochures, to inform visitors about the pack-in/pack-out policy for solid waste, which would likely reduce some litter problems in remote sites.

Mitigation and Residual Impacts [Alternative C]

Mitigation measures proposed for Alternative C consist of the use of water-saving technology, similar to those proposed under Alternatives A and B. Likewise, water shortages occurring at times of peak demand may still occur as residual impacts.

Cumulative Impacts [Alternative C]

Cumulative impacts associated with increased recreation use and regional population growth under Alternative B would be similar to those under Alternative A by adding to demands on local public service providers and increasing resource pressures. To function successfully, Alternative C would likely place increased demands on local public services.

3.12 Environmental Justice

This section addresses impacts associated with the alternatives on environmental justice issues in the vicinity of Prineville Reservoir.

3.12.1 Affected Environment

In February 1994, the President issued Executive Order 12898 that requires all Federal agencies to seek to achieve environmental justice by “identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations” (Executive Order 12898).

The resource management planning and NEPA environmental review process for the Prineville Reservoir RMP complied with Executive Order 12898 by identifying minority and low-income populations early in the process and incorporating the perspectives of these populations into the decision-making process.

The Department of Housing and Urban Development (HUD) defines low income as 80 percent of the median family income for the area, subject to adjustment for areas with unusually high or low incomes or housing costs. Based on the HUD standard, Crook County (with an average 1998 per capita income of \$19,905) would not be considered a low-income population in Oregon, which had a statewide 1998 per capita income of \$23,920. Nearly 93 percent of the population is white; thus, the potentially affected minority population in this region is extremely limited including 1,082 Latinos, 1,006 mixed and other races, 250 Indian/Alaska Natives, and a small handful of others.

3.12.2 Environmental Consequences

3.12.2.1 Alternative A – No Action: Continuation of Existing Management Practices

While there are no statistics available on the racial or economic status of users of Prineville Reservoir, it is likely that users are a proportional reflection of the local and regional population. Alternative A would generally comply with Executive Order 12898, but lower income families or individuals may be affected more from fees for developed campsites compared to middle or upper income families or individuals. Fees for campsites would be developed according to OPRD guidelines, which offer a relatively low cost recreation option for the provided amenities. Therefore, only minor effects would be anticipated from the fees charged at campsites around the reservoir to lower income populations.

Mitigation and Residual Impacts [Alternative A]

As stated in Chapter 5 (Environmental Commitments), entrance and user fees will be structured to allow many individuals and families of different income levels to use Prineville Reservoir lands and facilities. In addition, a range of recreational opportunities that appeal to a wide variety of visitors, including low income users, would be provided.

Cumulative Impacts [Alternative A]

Increased recreation use and regional population growth are likely to continue to put pressure on existing and proposed recreation facilities at Prineville Reservoir, resulting in potential competition for

use of recreation sites. These effects would be common for all user groups and no disproportionate effects are anticipated.

3.12.2.2 Alternative B – Natural Resource /Dispersed Recreation Balance

Environmental justice effects would be similar to those described under Alternative A; however, the increase in dispersed camping options under this alternative would provide more free camping opportunities for low-income visitors.

Mitigation and Residual Impacts [Alternative B]

Mitigation measures proposed for Alternative B consist of fee structuring supportive of visitors of different incomes as addressed in Chapter 5 (Environmental Commitments) and would be similar to those proposed under Alternative A.

Cumulative Impacts [Alternative B]

Increased recreation use and regional population growth are likely to continue to put pressure on existing and proposed recreation facilities at Prineville Reservoir, resulting in potential competition for use of recreation sites.

3.12.2.3 Alternative C – Natural Resource Protection/Formal Recreation Emphasis (Preferred Alternative)

Environmental justice effects would be similar to those described under Alternative A, although this alternative offers fewer free dispersed camping opportunities.

Mitigation and Residual Impacts [Alternative C]

Mitigation measures proposed for Alternative C consist of fee structuring supportive of visitors of different incomes as addressed in Chapter 5 (Environmental Commitments) and would be similar to those proposed under Alternatives A and B.

Cumulative Impacts [Alternative C]

Increased recreation use and regional population growth are likely to continue to put pressure on existing and proposed recreation facilities at Prineville Reservoir, resulting in potential competition for use of recreation sites.

3.13 Cultural Resources

The National Historic Preservation Act (NHPA) is the principal law directing cultural resource management actions on Federal lands. Section 106 of NHPA requires that agencies identify and seek to protect historic properties on Federal land or that will be impacted by a Federal undertaking. Associated regulations (36 CFR 800) and Departmental guidance define the processes to be used to comply with Section 106. Section 110 of NHPA directs agencies to manage historic properties on their lands as stewards of the resource for future generations. NHPA defines historic properties to include prehistoric and historic period archeological sites, buildings, or places that are of historic significance and are eligible for inclusion in the National Register of Historic Places (Register). Historic properties also include traditional cultural properties (TCPs). TCPs are places of special heritage value to contemporary communities (often, but not necessarily, Indian communities), and meet the criteria for eligibility to the Register. Their heritage value stems from their association with the cultural practices or beliefs that are important in maintaining the cultural identity of that community.

Indian tribes may identify places or resources that are of cultural value to the tribe, but do not conform to any of the Register's four criteria of historic significance. For this study, these are termed "culturally important resources." Federal agencies are not required to seek to protect culturally important resources as part of their historic property preservation programs.

3.13.1 Affected Environment

3.13.1.1 Previous Investigations

To date, approximately 2,945 acres of land around Prineville Reservoir have been inventoried for archeological resources, and 126 archeological sites and one human burial have been recorded. No TCPs have been recorded, but tribes have indicated that culturally important resources are present. The following discussions summarize cultural resource investigations and results through July 2002.

Archeological investigations first occurred in 1948, when the Smithsonian Institution's River Basin Survey (RBS) completed a reconnaissance survey of the reservoir basin prior to construction of the dam (Osborne 1948). The RBS team recorded nine archeological sites (35-CR-1 through CR-9) and the burial (35-CR-10). They noted, but did not record, two rock slab enclosures. They excavated the burial, which was later sent to the Smithsonian Institution. From surface evidence, the RBS team determined that the archeological sites were not historically important, and no data recovery occurred. No further cultural resource investigations occurred at the reservoir until the 1990s.

In 1992, Reclamation completed the Prineville Reservoir RMP. The RMP incorporated commitments to initiate systematic archeological investigations at the reservoir. The commitments focused on archeological site identification and preparation of a Cultural Resource Management Plan (CRMP). Consultation with the State Historic Preservation Officer (SHPO) was to occur to determine Register eligibility, where this could be accomplished using survey information. Reclamation anticipated that the surveys would be completed in 1993 and the CRMP would be written in 1994. Surveys did begin in 1993. However, a far greater number of sites were found than anticipated. The greater level of effort necessary to document these sites caused all available funding to be expended to survey and record sites in only a portion of the study area. Work resumed in 1998, when funding again became available. Since 1992, investigations have focused on conducting archeological surveys and test excavations in the areas

with the highest probability for cultural resources and the greatest potential for impact from reservoir operations or land use.

The principal investigations completed since 1992 are as follows. In 1993 and 1999, Reclamation's contractors completed intensive archeological surveys of lands on the north shore upstream of the County boat ramp, much of the south shore upstream of Juniper Point, and at the Big Bend recreational use area below the dam. The surveyors relocated four of the nine sites recorded by the RBS team, and recorded 116 new archeological sites. The 1993 surveys are reported in Morgan et al. (1999) and the 1999 surveys in Oetting (2000). In 1998 and 2002, the Powder House Cove area was surveyed, encompassing locations that might be developed under Alternatives B or C of this RMP update. The surveys are reported in Regan and Crisson (1998) and via pers. comm. (A. Oetting, 2002).

No sites were found at Big Bend recreational area. One site was recorded upstream of Powder House Cove (pers. comm., A. Oetting, 2002), in the area considered for recreation development under Alternative C. Sites were recorded throughout all other surveyed areas, even in locations where somewhat rougher terrain might have been expected to discourage frequent human use. Sites are present in or near all designated recreation areas around the reservoir except Owl Creek. They are present along much of the shoreline areas in the SWA, which are the focus of much of the dispersed boat-in or land-based camping and day use. Some are within the reservoir operational zone. The North Side Primitive Road passes through sites, as do other unauthorized roads and trails.

Of the 126 recorded archeological sites, nine are 20th century trash dumps; one is the foundation from a ranch/farmstead; one is a masonry structure that may have been the powder house used when constructing Bowman Dam; and two are rock overhangs with associated prehistoric archeological deposits. The remaining 113 sites are prehistoric archeological sites variously recorded as lithic scatters or artifact scatters. Diagnostic artifacts observed at the sites indicate they span the last 4,000 years. The prehistoric sites primarily consist of debitage from stone tool manufacture. Some sites also contain natural cobbles that exhibit wear from use as grinding implements. Two of those sites have boulders with ground surfaces indicating they were used as grinding platforms, and several have fragments of stones that appear to have been used as grinding platforms. Most formed tools found were projectile points or point fragments, scrapers, graters, or bifacial fragments.

As of 2002, most lands with a high or moderate probability for site occurrence have been surveyed. Most of the unsurveyed lands are extremely steep, rocky areas with low site potential. Additional survey is needed in some areas, particularly portions of the south shore below Juniper Point and up Bear Creek. The two rock enclosures noted by the RBS also need to be relocated.

In 1998, Reclamation began archeological test excavations at recorded sites in areas most subject to impacts. Test excavations were completed at 20 of the recorded sites in the vicinity of the Roberts Bay recreation use area (Oetting 1999). The test excavations indicate that three of those sites contain subsurface deposits that appear to make them eligible for the Register under criterion d. Sites eligible under criterion d have the potential to contribute new information that will expand our understanding of past lifeways. The remaining 17 sites tested at Roberts Bay appear to fail to meet Register criteria.

In 2001, preliminary test probing was completed at 44 of the recorded archeological sites on the north shore (Oetting 2001). The 44 probed sites are near the County boat ramp, within the State Park, near Jasper Point Campground, along the North Side Primitive Road, and between the North Side Primitive Road and the shoreline. The latter area encompassed recorded archeological sites in or near the

primitive-designated recreation areas in the SWA. The probing indicated that 29 of the 44 sites seem to lack any subsurface materials and are unlikely to meet minimum Register criteria. Fifteen of the probed sites required additional test excavation to determine their historic significance. All of these 15 sites are in locations that are commonly used for dispersed camping or day use. Some are where recreational development is proposed or where primitive-designated use is authorized. In 2002, more extensive test excavations were completed at four of those 15 sites. Two of the tested sites are at proposed recreation use sites within the State Park, and the other two are in the vicinity of the Old Field and Cattle Guard primitive-designated recreation areas. The additional test excavations confirmed that these four sites contain subsurface deposits, and at least three of the four appear eligible to the Register (pers. comm., A. Oetting, 2002). Consultation with the Oregon SHPO and with interested Indian tribes is needed before the final determination can be made about the historic significance of any of the sites discussed above.

Further investigations have been completed at the nine trash dump sites to assess their historic significance. The contractor has recommended that none of the nine dump sites be considered eligible to the National Register (Minor and Oetting 2002). No test excavations have yet occurred at the other archeological sites recorded at the reservoir to enable determination of their eligibility to the Register.

3.13.1.2 Tribal Consultations to Identify Traditional Cultural Properties

In 2001, Reclamation initiated tribal consultations to learn if TCPs or culturally important resources might be present at the reservoir. Prineville Reservoir is situated within the ceded lands of The Confederated Tribes of the Warm Springs Reservation of Oregon (Warm Springs Tribes). In January 2001, Reclamation management and staff met with staff from the Warm Springs Tribes' Natural Resources Department. They indicated that the Warm Springs Tribes' Cultural Committee would contact Reclamation if they felt it necessary to be involved in the RMP update. In July 2001, a member of the Cultural Committee contacted Reclamation and indicated that archeological sites, TCPs, and traditional subsistence plants were present near Prineville Reservoir, and they were concerned about their protection. In August 2001, Reclamation staff met at the reservoir with members of the Cultural Committee. The meeting focused on familiarizing Cultural Committee members with the RMP update process and goals, and with general discussions of land management issues and tribal concerns about resource management. The Cultural Committee indicated they would collect existing information about TCPs and provide it for Reclamation's use in preservation planning. They also requested that Reclamation complete an ethnographic study for the area. In March 2002, Reclamation contacted the Cultural Committee and learned they had talked with knowledgeable people in the tribe and identified several areas at the reservoir that have important plants and cultural sites. In April it was agreed that the Cultural Committee would visit the reservoir to collect field data. They would use the information when providing tribal comments in the Ad Hoc Work Group, and would share data with Reclamation, to the extent determined appropriate by the tribes. At this time, Reclamation had not yet received further information about the location or characteristics of TCPs or culturally important resources. Consultations with the Warm Springs Tribes about these resources will continue during the RMP implementation.

In 2001, Reclamation also notified the Burns Paiute Tribe and the Klamath Tribes of the RMP update and offered to meet to discuss cultural resource issues or concerns.

3.13.1.3 Current Integrity

Archeological contractors performing investigations at Prineville Reservoir were instructed to note factors obviously affecting the sites. The principal impacting agents they documented were:

- Reservoir operation, causing bank and surface erosion and exposing artifacts;
- Sheet erosion from uncontrolled surface runoff, usually noted where there was little vegetation;
- Over-use of areas by recreationists;
- ORV operation, both cross country or on unarmored roads, through archeological sites; and
- Relic collection on sites.

Although some sites may never have had large amounts of artifactual material, evidence indicates that relic collection has contributed to sparsity of material at many sites. Site documentation actions included counting and mapping the locations of artifacts at sites. Archeologists completing site documentation noted rapid (often overnight) disappearance of recorded but uncollected artifacts. Archeological sites that were documented in 1993 and then documented again in 1999 showed a reduction in surface-visible artifacts; in some cases, all diagnostic tools and many other artifacts were gone. Similar loss of documented artifacts occurred at some sites between visits in 2000 and 2001. Piles of artifacts picked up and then rejected by collectors were noted at several sites. Typically, loss of artifacts and the presence of collection piles were noted at sites at or near designated recreation sites or very near the shoreline in preferred dispersed use areas

3.13.2 Environmental Consequences

Archeological sites are very fragile. Much of a site's scientific value lies in maintaining the original vertical and horizontal spatial relationship of all artifacts. Any event or action that disturbs the soil or strips away vegetation can damage or destroy that spatial relationship, and also expose artifacts to looters. The Warm Springs Tribes have indicated that traditional subsistence plants and TCPs are present. Although Reclamation has not yet been informed of the kind and location of these resources, it can be assumed that uses that damage vegetation or disturb soils may harm these kinds of resources.

The three alternatives have the potential to adversely impact historic properties. Soil and vegetation disturbance can occur from construction of recreational improvements, continued or increased dispersed recreation, ORV use, wildfire suppression actions, and habitat and wildlife management actions. The trend of increased recreation use on these lands may increase relic collection and soil disturbance, and associated resource impacts, over time.

Actions under the alternatives also offer the potential benefit of aiding historic preservation. All alternatives include some level of programmatic cultural resource management activity, although under no alternative would application of these management actions protect and preserve all of the Register eligible sites from continued or new impacts. All alternatives call for increased enforcement of ORV restrictions. All alternatives presume application of BMPs described in Chapter 5. Implementation of the BMPs would avoid or reduce impacts to sites from all authorized uses except dispersed recreation. Where impacts cannot be avoided by application of BMPs, the alternatives all include the commitment to mitigate adverse impacts on the best examples of affected Register eligible properties.

3.13.2.1 Alternative A - No Action, Continuation of Existing Management Practices

Increased enforcement of restrictions on ORV use throughout the study area would reduce, and perhaps in some locations stop, ORV-induced rutting and churning of soils that redistribute archeological materials, damaging the scientifically informative horizontal and vertical spatial relationship. It would also reduce damage to vegetation, resulting in less soil erosion, fewer artifacts exposed to relic collection, and less damage to plant materials with traditional importance for Indian tribes. Enforced restriction of motorized vehicles to designated roads might reduce public use of lands at any distance from those roads. This would reduce the likelihood of vandalism or inadvertent damage to cultural resource sites away from roads.

The existing seasonal vehicle closure in the SWA halts vehicle-induced soil damage during that time period. There is likely little public use of the area during the closure, other than boat-in use of the shoreline. Continued limitation of the south shore of the SWA to boat-in day use would continue to protect resources there from ORV use.

Preparation of a comprehensive Habitat and Wildlife Management Plan would allow Section 106 compliance requirements, Reclamation's impact avoidance commitments, and related BMPs to be integrated into that program. This should reduce the chances of accidental damage to cultural resources.

The plan could be a means to define kinds of actions to avoid damage to archeological sites or TCPs, and would allow potentially beneficial actions to be incorporated into the wildlife program. The concept incorporates actions that could benefit Section 110 cultural resource protection goals, potentially extending them beyond the high priority focus area discussed above. These include restoration of vegetation, which would reduce erosion; fencing to keep livestock from sensitive habitat areas, which would reduce soil disturbance; and efforts to control ORV access to shoreline areas in the SWA, which would reduce soil disturbance. Fencing areas could potentially damage sites, either from fence installation or from livestock creating an entrenched pathway along the fence line. Construction of upland watering locations or ground-disturbing habitat restoration actions could damage sites. However, these risks could be minimized by application of Reclamation's commitment to avoid placing new developments within site boundaries (see Chapter 2).

Activities to define and implement habitat management actions would benefit cultural resources if those activities identify and eliminate uses that are impacting archeological sites and traditionally important plant communities. Fencing would have benefits or impacts, as discussed under the Habitat and Wildlife Management Plan. Keeping livestock away from the shoreline or other wet areas would be a benefit because animals sink into the wet ground, churn the soils, and damage archeological deposits.

Designating specific locations for the Juniper Bass, Cattle Guard, and Old Field camping areas would benefit cultural resources. At least 10 archeological sites lie along the SWA shoreline in the vicinity of these camping areas, and it is probable that as-yet undocumented TCPs or traditionally important plant communities are also present. Designating specific campsite locations could reduce random camping and allow designated campsites to be selected to avoid cultural resource sites. Designation of campsites would also allow enforcement of user restrictions. These actions could reduce ongoing use damages that archeological contractors observed at archeological sites in the area. These damages include: relic collection; damage from ORV activity; digging of fire, trash, or toilet pits into archeological deposits; and loss of vegetation that can increase surface erosion or harm traditionally important plant communities. Relic collection would likely continue on sites within walking distance of designated camping areas. If TCPs are present, they most likely would also be damaged by these ground-disturbing

activities. Note: these kinds of impacts are generic to recreation day use and camping activities at unimproved sites or primitive use areas discussed below.

Dispersed camping would be allowed to continue throughout the area, except between Roberts Bay and Long Hollow Creek. Dispersed day use would continue on all open lands. Boat-in day use would continue on all shoreline areas. These uses would allow continuation of impacts associated with recreation day use and camping at primitive locations described above. If the trend of increased recreational use continues, then the level of impact would increase, and it could extend into areas that currently are little used. It is possible that continued area-wide dispersed use would negate the benefits from designating specific campsites at Juniper Bass, Cattle Guard, and Old Field, as people turned away from those locations may simply camp at another location of their choice elsewhere at the reservoir.

Recreation improvements proposed for the Prineville Reservoir Resort and Powder House Cove are unlikely to impact cultural resources; no archeological sites are present in those areas. It is unlikely that TCPs are present because of extensive prior disturbances. Powder House Cove was used to dump spoil material excavated from Bowman Dam's foundation, and the portion of the resort involved under Alternative A is fully developed.

It is unlikely that adverse effects would occur from improvements to the County boat ramp. Although archeological sites are present, all but one lie outside of direct construction impact areas. One site may lie within impact areas, but it appears not eligible to the Register; consultation is needed with the SHPO to confirm this assessment. Reclamation must also consult with the Warm Springs Tribes to determine if they are aware of TCPs in the area. However, past road and facilities construction and impacts from recreational use make it unlikely that any TCPs that might once have been present would have survived.

Development of the State Park North Expansion Area and Antelope Creek Day Use Area would adversely affect cultural resources. One archeological site is present at each location, and each has at least isolated areas that contain subsurface deposits that may make them eligible to the Register. At the North Expansion Area, the subsurface deposits are confined to a very small area. Therefore, application of site protection commitments defined in Chapter 2 could avoid impacts to that portion of the resource site. At the Antelope Creek Day Use Area, it is not likely that adverse impacts to the archeological site can be avoided. However, the resource deposits in much of the construction impact zone are already being badly damaged by dispersed recreational use of the unimproved location. The site is also being impacted by erosion from reservoir operations and surface run-off. These damages will continue even if recreational improvements at this location do not go forward under the updated RMP because this location is very attractive for recreators. Consultations are needed with the Warm Springs Tribes to determine if TCPs are present. If they are present, it is very likely they are being impacted by existing uses and ongoing erosion and would be further damaged by proposed construction. There is a possibility that development of these locations could benefit cultural resources elsewhere at the reservoir. As discussed above, dispersed camping is authorized on the north shore in the SWA. Some of those campers may be in the SWA because they cannot currently be accommodated at improved campgrounds and would use campgrounds if there were space. This would reduce the number of dispersed campers and the resource impacts they can cause.

No cultural resource investigations have occurred in the Bear Creek designated use area. If sites are present, "status quo" actions under Alternative A would cause no new impacts. However, impacts described above for dispersed recreational use in primitive use areas are likely occurring and would continue to occur.

It is unlikely that adverse effects would occur from continued dispersed camping at Juniper Point. One archeological site is present, but it appears not eligible to the Register. Consultation is needed with the SHPO to confirm this assessment. Reclamation must also consult with the Warm Springs Tribes to determine if they are aware of TCPs in the area. If they are present, no new impacts are likely to occur under Alternative A, but ongoing effects from recreational use would continue.

Improvements at Roberts Bay East would provide designated camping areas. Three archeological sites that appear eligible to the Register are present in the Roberts Bay area, but all lie outside the construction area and would not be affected. Two additional archeological sites that appear to be not eligible to the Register lie within the construction zone and would be entirely destroyed. However, there is no responsibility to protect not eligible sites, so this would not constitute an adverse effect. Consultations with the SHPO are needed to confirm that these sites are not eligible. Consultations with the Warm Springs Tribes are needed to determine if TCPs are present in the proposed development area.

Much of the area proposed for development at Roberts Bay East has been extensively altered by past use and development, and it is unlikely that TCPs have survived. Under Alternative A, dispersed day use and camping would continue throughout the Roberts Bay area. The primary impacts to cultural resources in that area are from recreational use of the area (relic collection, soil disturbance from ORV use, sheet erosion from loss of vegetation). Therefore, continued dispersed day use and camping would allow these ongoing adverse effects to persist. Construction of the Roberts Bay East campground may somewhat reduce the amount of random camping in the area. However, “overflow” campers, or those who prefer a more primitive camping experience, will still disperse through the area and could impact cultural resources. Two of the three Register-eligible sites are located in areas on or reasonably near the shoreline, where camping or day use most commonly occurs. The third site is unlikely to be impacted by dispersed use, at least in the short term, because it is located well away from the shore. One of the three sites is on the shoreline in an area that may attract boat-in users. That same site benefits from the wetland protection measures that have stopped ORV access to the island. Additional archeological sites are present at Roberts Bay, but they do not appear to be eligible to the Register. Tribal consultations are necessary to determine if TCPs are present in areas that might be impacted by dispersed recreational use.

No impacts would occur from improvements to the roads to Roberts Bay where the road lies on Reclamation land. No survey has occurred along sections of road beyond Reclamation’s boundary but would be needed to assess potential impacts.

Under Alternative A, the cultural resource program goals would stay largely as implemented under the 1992 RMP. This commits Reclamation to go beyond compliance-based responsibilities defined in Section 106 of NHPA, and extends activities to programmatic survey, site recordation, testing, and resource protection in high priority locations. These are locations that are likely to contain historic properties, and are also most subject to damaging impacts from erosion or public land use. Alternative A adds specific commitments for TCP consultations and Archaeological Resources Protection Act (ARPA) awareness that were not addressed in the 1992 RMP. This makes Alternative A an improvement over the existing condition defined in the 1992 RMP.

Mitigation Measures and Residual Impacts [Alternative A]

Residual impacts would be as follows:

Alternative A would allow for incremental application of a management program focused on high priority areas. However, even while beneficial resource management actions were occurring at some

sites in the high priority areas, unmitigated damaging impacts from erosion or land use would continue to occur on other sites in the high priority areas. Sites outside of the high priority areas would be adversely affected by ongoing erosion or land use before Reclamation may be aware of the damage. This focus would make it difficult for Reclamation to fully comply with Section 110 resource management responsibilities.

It is unreasonable to expect to be able to halt the dispersed recreational uses that are damaging the greatest number of cultural resources sites, as that would effectively make many of the most attractive areas closed to many public uses. Therefore, compliance with NHPA will most likely occur through selecting the best few sites in the high priority zone and focusing protective or mitigation actions on those sites. The remaining Register-eligible sites are unlikely to receive protection or mitigation actions.

Cumulative Impacts [Alternative A]

Indications are that recreational visitation at Prineville Reservoir will continue to increase in coming years. This is likely to increase relic collection and pot hunting at sites. Unless strictly controlled, it is likely that ORV use will increase, causing soil disturbances that damage archeological deposits or vegetation loss that increases soil erosion. There would be an increase in dispersed camping, dispersed day use, and boat-in use of shoreline areas, with associated increases in relic collection; digging of fire, trash, and toilet pits in sites; increased soil erosion due to loss of vegetation; and damage to TCP's and culturally important traditional plant communities.

3.13.2.2 Alternative B: Natural Resource/Dispersed Recreation Balance

Impacts and benefits for Alternative B would be the same as for Alternative A, except as described below.

Improved enforcement of the ORV restrictions would increase cultural resource protection benefits over Alternative A, further reducing soil and vegetation disturbances that damage the resource sites and traditionally important vegetation communities.

Alternative B does not include preparation of a comprehensive Habitat and Wildlife Management Plan. This would reduce the benefit observed under Alternative A, as the opportunity for programmatic integration of cultural resource impact avoidance commitments and BMPs into the wildlife program would be lost. There would be less opportunity to shape wildlife enhancement actions to aid cultural resource management objectives. Case-by-case review and clearance for ground-disturbing implementation actions would be required. Benefits would still occur from restoration efforts that reduce soil erosion if it occurs where cultural resources sites are suffering from erosion and from a continued emphasis on reducing ORV impacts.

Alternative B proposes to construct boundary fencing where adjacent land use conflicts with Reclamation management objectives. This could benefit cultural resource management over Alternative A. The fence would clearly mark the boundary so that the public would understand where Reclamation's ORV closure takes place and aid personnel enforcing that closure. Damages could occur if the fence were constructed through a cultural resource site.

Actions to protect scenic values would be initiated under Alternative B. These have the potential to benefit cultural resources if TCPs are identified where viewshed characteristics are a contributing value.

Ground-disturbing actions associated with wildfire suppression could damage sites, including construction of access roads, fire breaks, and spike camps or clean-up actions such as grubbing.

Alternative B would maintain existing conditions and use patterns at the four designated primitive camping areas in the SWA. This is less beneficial to cultural resources than under Alternative A, as it would allow the currently uncontrolled use to continue. Without campsite designation, camping cannot be directed away from cultural resource sites in the area. This would increase impacts from dispersed camping over those identified for Alternatives A or C.

At Prineville Reservoir Resort, additional cabins and campsites would be constructed, but the possible locations are not yet identified. The undeveloped areas of the peninsula away from the resort and Jasper Point Campground are largely undisturbed, and several archeological sites are recorded there. Tribal consultations would be needed to determine if TCPs were present; if they are present, they are likely to retain their tribal value. If proposed development occurred on or near an archeological site or TCP, it would damage or destroy the site. Even if direct construction impacts are avoided, increased use of this area would increase the danger of relic collection or damage from vegetation loss.

There would be no impact to cultural resources from the action proposed at Jasper Point Campground and boat ramp. Although an archeological site is present, the portion within the existing campground has been determined not eligible to the Register. There is essentially no likelihood of TCPs as this is a developed campground.

Additional parking proposed at Powder House Cove would have no impact on archeological properties. Consultations would be needed to determine if TCPs are present.

Developments at Antelope Creek Day Use Area would be expanded under Alternative B to include a group day use area. This would expand damaging impacts described under Alternative A into another portion of the archeological site.

At Roberts Bay, Alternative B would provide cultural resource benefits not offered under Alternative A. Principal existing impacts are from dispersed recreational use, which exceeds the capacity of facilities. Additional facilities constructed at Roberts Bay would not impact any of the three archeological sites that appear eligible to the Register. They would be located near several other archeological sites that appear to be not eligible to the Register; SHPO consultations are needed to confirm the eligibility status of those sites. Alternative B proposes to have a camp host on site, and this would provide a benefit to cultural resources not offered under Alternative A. The presence of a camp host typically reduces or eliminates unauthorized activities at a location, and the host can monitor site condition.

Under Alternative B, programmatic (Section 110) cultural resource management actions would also occur in authorized use areas where no development would occur (such as boat-in day use areas). If needed, TCP inventories would be initiated, focusing on high priority areas. These actions would bring Reclamation into compliance with Section 110 in areas not considered under the current program. This is an improvement over Alternative A.

Mitigation Measures and Residual Impacts [Alternative B]

Residual impacts would be the same as for Alternative A, except that under Alternative B:

There is an improvement over Alternative A, in that Section 110 resource management actions extend into additional areas, reducing the residual effect overall. However, large areas would still not be incorporated into systematic resource identification and management processes. Data indicate that sites in those areas are subject to ongoing adverse effects, most notably from dispersed recreational use and ORVs.

If TCPs are identified, overall impacts would be reduced relative to Alternative A. However, those located outside of high priority impact areas would still be offered no programmatic management consideration.

Residual impacts would increase in the SWA relative to Alternative A, since no boundaries would be defined for the four primitive-designated camping areas.

Cumulative Impacts [Alternative B]

Same as for Alternative A.

3.13.2.3 Alternative C: Natural Resource Protection/Formal Recreation Emphasis (Preferred Alternative)

Environmental consequences under Alternative C would be the same as for Alternative B, except for the following:

Alternative C would provide greater benefit through policy enforcement actions than either Alternative A or B. It would further increased ORV enforcement and more clearly define roads opened to motorized vehicles. It would prohibit or limit new private road development on Reclamation lands. Since authorized roads tend to become avenues from which unauthorized ORV users depart, this constraint should further reduce ORV damage to lands and their resources. It would improve enforcement capability on Reclamation lands through improved County ordinances and enforcement of Reclamation regulations. Expanded law enforcement presence can further control unauthorized uses of the lands and reduce resource damage from inappropriate uses.

Alternative C would include preparation of a comprehensive Habitat and Wildlife Management Plan. This would incorporate the potential benefits discussed under Alternative A.

Alternative C specifies cultural resource sites as sensitive resources from which grazing will be eliminated. This may increase land user and agency awareness and aid in avoiding inadvertent damages. Site examination would be needed to assess if grazing is causing damage.

The alternative would provide basic amenities for boat-in use at selected locations to concentrate use. However, there would be no greater restrictions on boat-in use than under Alternative A or B. Therefore, in most locations this would not reduce the ongoing adverse impacts to cultural resource sites.

Alternative C would restore the intent to define primitive-designated camp areas in the SWA, as well as add the intent to mark the perimeter and require camper registration. This is the most beneficial approach for cultural resources of those considered in this study. Marked boundaries would allow restrictions to be enforced, and registration would increase public awareness that management oversight is occurring. Secondary impacts of increased relic collection on surrounding sites could still occur.

Alternative C would limit camping on the north shore within the SWA to the five primitive-designated camping areas, but continue to allow dispersed day use throughout that larger area. This may slightly reduce impacts as identified for Alternatives A and B. However, even during day use, people still use the land in ways that cause soil disturbance that damages resources.

For Prineville Reservoir Resort expansion, no sites have been found at Social Security Beach, and so formalizing that use would not affect cultural resources. Analysis of other effects is the same as for Alternative B.

For Powder House Cove, Alternative C would provide a large new facility upstream of the existing ramp. One historic property is present, but this structure can be avoided during development. Consultations to determine if TCPs are present in this area remain to be completed. If no TCPs are present, there would be no effect to cultural resources from development.

Alternative C provides the greatest cultural resource benefits for sites in the Roberts Bay area. Potential impacts from construction would largely be as described for Alternative B. However, there may be a significant reduction in ongoing impacts from dispersed use, as recreation use would be better contained and on-site management by camp hosts would increase.

Programmatic cultural resource management would incorporate all actions identified for Alternative B, as well as extend Section 110 management actions to all areas with potential user impacts. Over time, this would bring Reclamation into full compliance with Section 110 of NHPA. The more extensive public outreach and education elements would enhance compliance with NHPA and ARPA requirements to disseminate cultural resource information for the enjoyment and education of the public, further aiding in resource protection.

Mitigation Measures and Residual Impacts [Alternative C]

Residual impacts would be as follows:

Alternative C allows for comprehensive cultural resource management, which would greatly benefit the resource. However, practicality requires that a program of this scope and expense be implemented incrementally. Therefore, while beneficial cultural resource management actions are occurring at some sites, damaging or unmitigated impacts would continue to occur on other sites not yet incorporated into the management program.

As previously identified, it is unreasonable to halt all actions that are damaging the greatest number of cultural resource sites. Even under a comprehensive resource management program, sites will still be sacrificed. NHPA does not require protection of all Register eligible sites, and practical funding issues will not allow Reclamation to consider protection of all eligible sites.

Cumulative Impacts [Alternative C]

Same as for Alternative A.

3.14 Indian Sacred Sites

3.14.1 Affected Environment

Indian sacred sites are defined in Executive Order 13007 as “any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site.” Federal agencies are required, to the extent practicable, to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and seek to avoid adversely affecting the physical integrity of such sites.

No Indian sacred sites are known to exist within Reclamation’s jurisdiction at Prineville Reservoir. As described above under Section 3.13 (Cultural Resources) Reclamation has contacted the Warm Springs Tribes, the Burns Paiute Tribe, and the Klamath Tribes and notified them about the RMP update. Reclamation requested that the tribes inform Reclamation if Indian sacred sites are present. No response has been received from the Burns Paiute Tribe or the Klamath Tribes. The Warm Springs Tribes have indicated that culturally important resources are present but have not indicated that sacred sites are present.

3.14.2 Environmental Consequences

No sacred sites have been reported at the reservoir at this time. If Indian sacred sites are identified in the future, then impacts upon those sites would be evaluated at that time.

3.14.2.1 Residual Impacts

Residual impacts would occur if Indian sacred sites are found and are endangered from reservoir-related erosion or from land use, and those site cannot be protected from further damage.

3.14.2.2 Cumulative Impacts

Indications are that recreational visitation at Prineville Reservoir will continue to increase in coming years. If Indian sacred sites are present, this might impact those sites in several ways. People using the site location might inadvertently damage natural or cultural features that are important to the sacred nature or continued use of the location for traditional religious purposes. Increased density of recreational use might also unintentionally intrude upon the privacy that is necessary or desirable when practicing traditional religious activities.

3.15 Indian Trust Assets

3.15.1 Affected Environment

Reclamation has an established policy (October 3, 1993) to protect Indian Trust Assets (ITAs) from adverse impacts of its program and activities and to enable the Secretary of the Interior (Secretary) to fulfill responsibilities to Indian tribes. ITAs are legal interests in property held in trust by the United States for Indian tribes or individuals. The United States, with the Secretary as the trustee, holds many assets in trust for Indian tribes or Indian individuals. Examples of ITAs include lands, minerals, hunting and fishing rights, and water rights. While most ITAs are on-reservation, they may also be found off-reservation.

The United States has an Indian trust responsibility to protect and maintain rights reserved by or granted to Indian tribes or by Indian individuals by treaties, statutes, and executive orders. These are sometimes further interpreted through court decisions and regulations.

3.15.1.1 Confederated Tribes of the Warm Springs Reservation

The Confederated Tribes of the Warm Springs Reservation (Warm Springs Tribes) include the Wasco, Warm Springs, and Northern Paiute Tribes. The Warm Springs Reservation was created by the Treaty with the Tribes of Middle Oregon in June 25, 1855 (Treaty of 1855) and covers an area of 640,000 acres in the Deschutes River basin within Central Oregon. The Warm Springs Tribal territory originally comprised more than 10 million acres. This territory was ceded to the United States in return for retaining and preserving the Warm Spring Tribes rights to self-govern, fish, hunt, graze livestock, and gather foods within those lands. The Warm Springs Tribes reserved ITAs are hunting, fishing, and gathering rights on ceded lands.

Prineville Reservoir and the area of Reclamation's proposed action is located within the Warm Springs Tribes ceded area. ITAs of potential concern to the Warm Springs Tribes include the rights to fish, hunt, graze livestock, and gather food. The resources that provide for these rights to be exercised include fish, wildlife, and vegetation. The Warm Springs Tribes especially value the need to augment flows and restore historical fishing opportunities in the Deschutes River basin, particularly anadromous fish resources. Huckleberry (*Vaccinium membranaceum*) and other traditionally harvested vegetation and roots are also very important food resources for the Warm Springs Tribes.

A description of important Native American Indian Trust assets in the Deschutes River Basin has been further documented by the Warm Springs Tribes in Restoring Oregon's Deschutes River - Developing Partnerships and Economic Incentives to Improve Water Quality and Instream Flows (Moore et al. 1995). The Warm Springs Tribes have identified that their paramount goal is to enhance Deschutes River tribal fisheries by increasing instream flows. The Warm Springs Tribes portfolio of trust assets and treaty rights – on-reservation, off-reservation, water resources – “all.....depend on a continuing supply of high-quality water” in the Deschutes River Basin (Moore et al. 1995).

Reclamation sent a letter, dated September 24, 2001 to the U.S. Bureau of Indian Affairs (BIA) requesting formal information on any ITAs held in trust by the United States in the proposed Federal action area. BIA's formal response is contained in Appendix H.

As indicated in Chapter 4, the Warm Springs Tribes will be consulted to determine if TCPs and Indian Sacred sites are present and are impacted by the proposed action.

3.15.1.2 Klamath Tribes

The Klamath Tribes Natural Resource Department was contacted by letter on August 22, 2001 to determine if the tribes assert traditional hunting, fishing, and grazing rights in the study area. They were also asked if TCPs and Indian Sacred sites are present and are impacted by the proposed action. No response has been received.

3.15.1.3 Burns Paiute

The Burns Paiute Tribe holds no off-reservation Treaty rights, and therefore no ITAs, in the study area. As indicated in Chapter 4, the Burns Paiute Tribe has been consulted by letter dated August 22, 2001 to determine if TCPs and Indian Sacred sites are present and are impacted by the proposed action. No response was received.

3.15.2 Environmental Consequences

The BIA indicates that no known ITA lands are present in the RMP study area. None of the alternatives would affect ITAs.

3.16 Paleontological Resources

3.16.1 Affected Environment

Eastern Oregon is rich in vertebrate, invertebrate, and botanical paleontological materials. The John Day basin is recognized to have some of America's more important Oligocene, Miocene, and Pliocene epoch deposits. These deposits have been the focus of scientific research since the late 1800s. The John Day Fossils Beds National Monument, located about 50 miles northeast of Prineville Reservoir, was created to foster continuing research and to interpret the fossil materials and paleo-environment of the area for the public.

Most area paleontological deposits are associated with specific geological formations. Eocene-Oligocene-Miocene deposits dating from 55 to 19 million years ago are found in the Clarno and John Day Formations. Fossil deposits have been documented in these geological formations extending through and south of the Prineville Reservoir area. Geological maps indicate outcrops of both the Clarno and John Day Formations on lands in the central section of Prineville Reservoir. One finding of botanical fossil materials has been reported from Reclamation lands, but only the approximate area of the find is known.

No inventories of paleontological deposits have been completed at the reservoir. However, as part of archeological surveys in 1993 and 1999, archeological crews were required to record any fossil materials or localities noted during their work. No such materials were found. However, no archeological survey has yet occurred in areas where Clarno or John Day Formations are exposed on the ground surface.

3.16.2 Environmental Consequences

Since paleontological localities have not been documented at Prineville Reservoir, no specific impacts can currently be analyzed. We do know that no Clarno or John Day Formations surface in any areas where facility construction or other ground-disturbing actions are proposed, and archeologists surveying these locations noted no fossil materials. Therefore, it is unlikely that impacts to paleontological resources will occur from actions proposed in these locations under any alternative. If fossil-bearing formations surface within the operational zone of the reservoir, then reservoir-induced erosion may have exposed fossil materials. Exposed fossils would be vulnerable to collection and digging might occur by fossil collectors, which would further damage the deposits. Collection could also occur if fossil materials are exposed elsewhere on Reclamation lands visited by boat-in or hike-in users.

3.16.2.1 Residual Impacts and Mitigation

Mitigation needs cannot be identified at this time, as no paleontological resources have been identified within the project area. If, in the future, they are found within the reservoir erosional zone, Reclamation will apply the commitments defined in Chapter 2 and Chapter 5.

Residual impacts would occur if paleontological resources were found, were endangered by reservoir erosion or land use, and no actions were taken to assess their scientific value. Residual effects would also occur if scientifically valuable fossil deposits were discovered and the appropriate management actions were not taken to prevent damage to or loss of the resource, or to mitigate unavoidable effects.

3.16.2.2 Cumulative Impacts

Indications are that recreational visitation at Prineville Reservoir will continue to increase in coming years. This might increase unauthorized collection of exposed fossil materials, if fossils are present in erosional areas.

3.17 Transportation and Access

3.17.1 Affected Environment

This section addresses vehicular access to destinations at the Prineville Reservoir from local and regional population centers. Information on local airports and bus service is also included. Access and circulation are illustrated on Figure 3.17-1.

3.17.1.1 Road Access

Primary road access from the City of Prineville to the Prineville Reservoir area, including Prineville State Park, Prineville Reservoir Resort, Jasper Point, and the County boat ramp, is provided via Juniper Canyon Road. State Route 27 provides access from the City of Prineville to Bowman Dam and Powder House Cove with connections to other destinations on the reservoir's south side. The north end of the reservoir is accessed from the City of Prineville by a 15-mile section of the Combs Flat Road (Paulina Highway, State Route 380). From the City of Bend, most visitors travel to the south side via Alfalfa Road, which connects with State Route 27.

Juniper Canyon Road is the primary road leading to the most heavily used recreation sites on the reservoir's north shore. The 17-mile-long, 2-lane asphalt and oil mat-surfaced road is well maintained by Crook County and was resurfaced most recently in 1998. The asphalt paved portions of the road are 24 feet wide with 2-foot gravel shoulders on either side. Most of this road has a posted speed limit of 55 mph, which is reduced closer to the reservoir due to numerous curves in this part of the road. Peak traffic volumes on the Juniper Canyon Road approach 4,000 trips per day (pers. comm., Thompson, 2001). State Route 27 (also known as the Crooked River Highway) parallels the river below the dam through the winding, scenic Crooked River Canyon. This road is also a well-maintained 2-lane asphalt road but is a little longer, and speeds are slower as a result of the numerous curves.

Between Jasper Point and the upper end of the reservoir within the Prineville Reservoir SWA, access to primitive shoreline campsites at Owl Creek, Juniper Bass, Cattle Guard, and Old Field is provided via the 6.3-mile-long North Side Primitive Road. The Combs Flat Road (Paulina Highway) intersects the primitive road at the northeast end of the reservoir. The primitive road is unsurfaced and seldom wide enough for two vehicles to pass. Numerous curves, substandard gradients, and limited drainage and maintenance render the road virtually unsuitable for safe or sustained public travel, particularly following precipitation when the road is wet and slippery. The western two-thirds of the road is located on steep slopes with many curves. The eastern one-third is located on more gently sloping topography with fewer curves and abrupt changes in elevation. The road currently does not meet the minimum standards for rural roads. Traffic control, road directional, and information signs are lacking in most areas. The North Side Primitive Road is open on a seasonal basis only—generally from April 15 to November 15 from Jasper Point to Old Field, and March 15 to December 15 from Old Field to Combs Flat Road to accommodate wintering deer and other wildlife.

Road access to the Reservoir's south shore is extremely limited. Road access to destinations on the reservoir's south side (including Roberts Bay, Bear Creek, Powder House Cove, Bowman Dam, and the lower Crooked River) is via the Crooked River Highway, State Route 27, which originates in the City of Prineville and links U.S. Route 26 with U.S. Route 20 to the south. Between Prineville and Powder House Cove south of Bowman Dam, State Route 27 is a 2-lane asphalt-surfaced road.

Farther south toward U.S. Route 20, Route 27 becomes a wide and well-maintained graveled road. Traffic volumes on SR 27 range from 1,100 average daily trips south of the City of Prineville to 90 near the junction with Alfalfa Road (ODOT website 2001).

The most direct route from Bend follows SW Willard Road, which connects to SW Reservoir Road and SE Reservoir Road before intersecting with State Route 27. Collectively, this route, which was paved with an oil-mat surface from 1988 to 1998, is known as Alfalfa Road. This smooth road surface has substantially reduced driving time from Bend to only 30 to 45 minutes, making Prineville Reservoir an increasingly popular destination for visitors from the Bend area.

State Route 27 leads directly to the Powder House Cove recreation site, with access to the Bear Creek Arm of Prineville Reservoir requiring travel on a single lane primitive road (SE Lakeview Road) adjacent to Bear Creek. Access to the Roberts Bay area requires traveling on a 2-lane graveled County Road called S. Salt Creek Road to the old stage stop know as Roberts. The section from Roberts to the Reclamation boundary, known as the Roberts Bay Road, is seldom maintained and in poor condition. If legal access can be determined or acquired, Reclamation in cooperation with OPRD, will take responsibility for maintaining the road to Roberts Bay commensurate with the level of facility development. See Appendix K for communications with Crook County regarding the Roberts Bay Road. County and State road data are summarized in Table 3.17-1.

Table 3.17-1: County and State roads in vicinity of Prineville Reservoir.

Road Name	#	Classification	Surface	Condition
S Juniper Canyon	214	Major Collector	Asphalt/oil mat	good
SW Willard	351	Minor Rural	oil-mat	good
SW Reservoir	332	Minor Rural	oil-mat	good
SE Reservoir	332A	Minor Rural	oil-mat	good
SE Lakeview	355	Minor	gravel	fair
S Salt Creek	134	Minor	gravel	good
Crooked River Hwy	SR 27	Highway	paved	good
Combs Flat Road	SR 380	Highway	paved	good

Source: Crook County Road Department 1988

3.17.2 Environmental Consequences

3.17.2.1 Alternative A – No Action: Continuation of Existing Management Practices

Alternative A includes a number of recommendations to improve local access conditions at Prineville Reservoir. Some of these measures from the 1992 RMP have been implemented and some have not. As discussed in other sections of this Final EA, increased enforcement of ORV regulations proposed under this alternative have resulted in positive impacts in terms of resource protection but also in terms of safety and road maintenance. This alternative also proposes a travel management plan that would mark roads that are open for vehicle travel. If implemented consistently, such a measure would provide motorists with the necessary information for navigation and provide law enforcement and park rangers with an important management tool. Under this alternative, the current seasonal road closures on portions of the North Side Primitive Road would remain in effect for the benefit of wildlife, primarily winter deer and elk. In addition to serving wildlife, these closures have the secondary benefit of reducing maintenance requirements during the wettest part of the year when this unpaved road is susceptible to the most damage. Because both ends of this road are roughly the same distance from Prineville via alternative routes, this continued closure poses no significant access problem (see Appendix K for correspondence with Crook County on this issue).

**Prineville Reservoir Resource Management Plan
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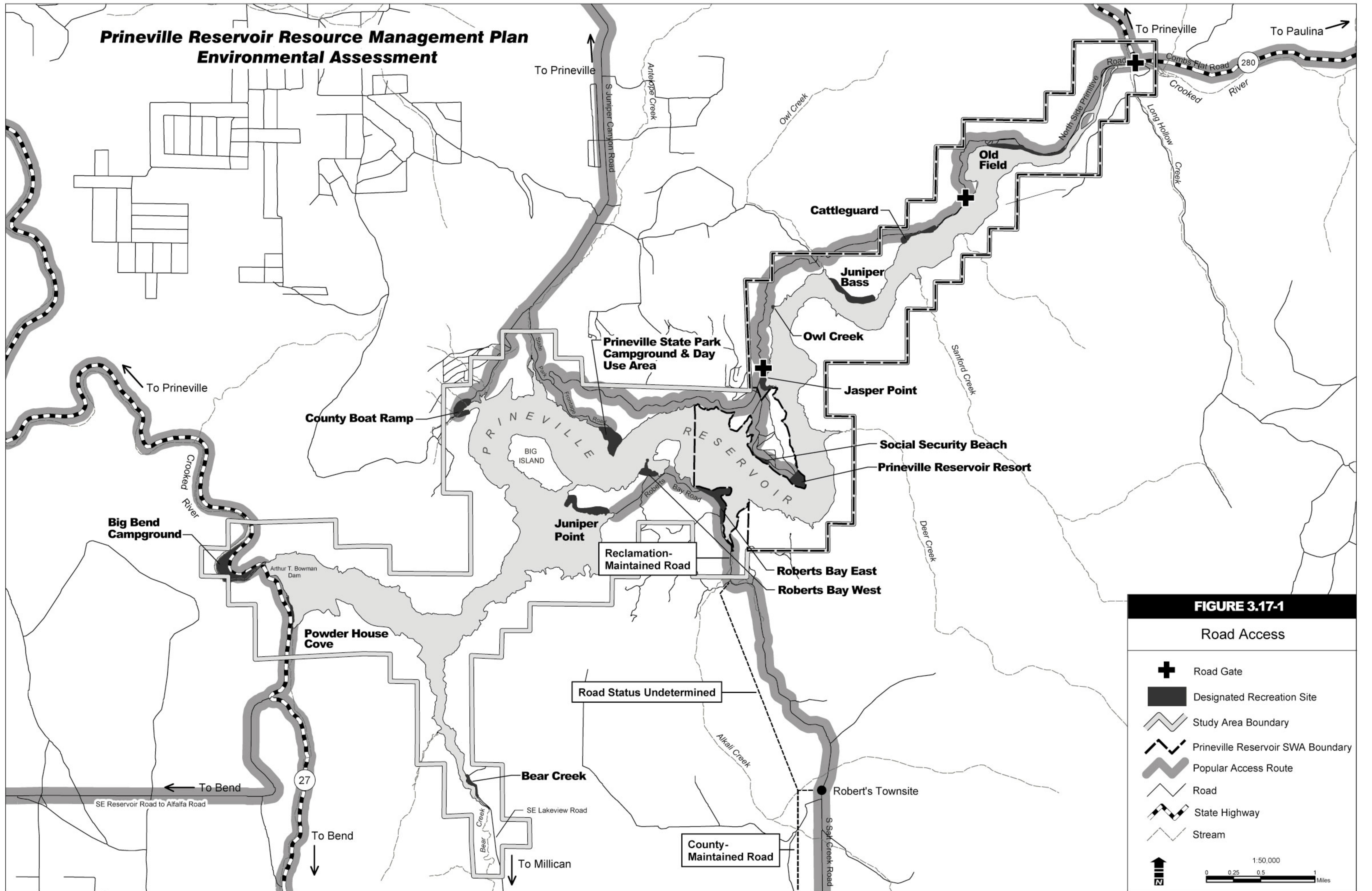


FIGURE 3.17-1

Road Access

- Road Gate
- Designated Recreation Site
- Study Area Boundary
- Prineville Reservoir SWA Boundary
- Popular Access Route
- Road
- State Highway
- Stream

1:50,000
0 0.25 0.5 1 Miles

Source: Reclamation, 2001; OPRD, 2001; EDAW, 2001.

Alternative A includes proposed construction of a concrete boat ramp and a gravel parking lot at Powder House Cove with spaces for up to 25 vehicles (including 22 trailer stalls). Although this would be an improvement over existing conditions, this facility would be inadequate to meet current demand at Powder House Cove, which has increased significantly since 1992. As a result, vehicles and boat trailers could be expected to continue to park along the shoulder of State Route 27, continuing existing adverse parking, vehicle movement, and safety conditions.

Improvements to 0.7-mile-long Roberts Bay Road with new culverts, widening, and directional and traffic signs would significantly improve access to and through the Roberts Bay area, resulting in benefits in terms of safety and resource protection. Reclamation only has authority over Roberts Bay Road on Reclamation lands. This section is already in fairly good shape. Increased use on remainder of Roberts Bay Road with or without development can only be expected to increase, resulting in more road deterioration and maintenance needs.

Traffic may slightly increase under Alternative A from the increased availability of facilities at Antelope Creek and improvement to road access to Roberts Bay. These actions would be balanced by increased enforcement of vehicle rules and more controlled camping activity in the SWA and Roberts Bay East, which would reduce the density of camping and reduce dispersed driving and parking. Roberts Bay West would continue to be used for dispersed camping and may see greater traffic and camping density if Roberts Bay East designated campsites are regularly filled.

Mitigation and Residual Impacts [Alternative A]

No mitigation measures are proposed for Alternative A because the actions under this alternative do not have substantial adverse impacts on transportation and access in the RMP study area or in the surrounding vicinity. Residual impacts could include slight increases in traffic as discussed above.

Cumulative Impacts [Alternative A]

Increasing use of roads in the vicinity of the Prineville Reservoir will likely accompany continued population growth throughout central Oregon. Additional traffic would impact access to Prineville Reservoir under any of the alternatives.

3.17.2.2 Alternative B – Natural Resources/Dispersed Recreation Balance

Transportation and access impacts anticipated under Alternative B would be similar to those under Alternative A, although Alternative B lacks some of the management tools such as the travel management plan and increased ORV enforcement that could result in positive impacts under Alternative A. Nevertheless, Alternative B does propose increasing enforcement of vehicle access rules.

With over three times as many parking stalls proposed under this alternative for Powder House Cove than under Alternative A, Alternative B would likely eliminate much of the existing overflow parking and its associated impacts on the shoulder of State Route 27.

Alternative B is more permissive of unmanaged, dispersed recreation activity than either of the other alternatives, especially along the reservoir's south shore. Continued dispersed camping around Roberts Bay (especially during summer holiday weekends) would likely continue to generate higher levels of use and corresponding vehicle trips than would be generated by either of the other alternatives. This alternative does not include provisions to improve Roberts Bay Road itself but does include traffic and

directional signage and would include improved maintenance through coordination with appropriate authorities. Traffic associated with activity in the Roberts Bay area would be most noticeable on Roberts Bay Road itself, South Salt Creek Road, and sections of State Route 27.

Mitigation and Residual Impacts [Alternative B]

No mitigation measures are proposed for Alternative B because the actions under this alternative do not have substantial adverse impacts on transportation and access in the RMP study area or in the surrounding vicinity. Residual impacts could include modest increases in traffic but without necessary road improvements as discussed above.

Cumulative Impacts [Alternative B]

Increasing use of roads in the vicinity of the Prineville Reservoir would likely accompany continued population growth throughout central Oregon. Additional traffic would impact access to Prineville Reservoir under any of the alternatives.

3.17.2.3 Alternative C – Natural Resource Protection/Formal Recreation Emphasis

Alternative C includes a number of provisions intended to limit vehicular access to designated roads and preventing vehicle use in the junipers and drawdown zone. Likewise, Alternative C includes closure of the entire North Side Primitive Road for the entire winter, as well as providing the flexibility to adjust the closure dates based on prevailing conditions. These provisions, intended to protect natural resources, may affect recreational vehicular activity to a limited degree, but not authorized access and transportation needs. These provisions, along with proposed signage program and visitor brochures, would enhance public understanding of resource management issues and help motorists comply with the proposed programs. Under this alternative, four primitive designated campgrounds (Juniper Bass, Old Field, Owl Creek, and Cattle Guard) would include a total of 63 campsites all accessed by the North Side Primitive Road. This alternative provides no road improvements even though camping fees may increase the service expectations of campsite customers, thus creating potential management issues for OPRD and Reclamation.

Alternative C is the only proposal that fully addresses the magnitude of current demand at Powder House Cove by proposing a new day use/boat ramp area with large parking capacity for cars and trailers away from State Route 27. This would likely eliminate shoulder parking and dramatically improve lake access for Bend area visitors while reducing parking-related impacts along a narrow, curving section of State Route 27.

If legal access can be determined or acquired, Reclamation in cooperation with OPRD will take responsibility for maintaining the road to Roberts Bay commensurate with the level of facility development. If legal access cannot be determined or obtained, and Reclamation cannot responsibly manage these lands, then it may be necessary to close this recreation area.

Access to the Roberts Bay area (and resulting impacts) would be improved by a defined road system. This would enhance safety and circulation throughout Roberts Bay. In addition, a “Park Full” indicator sign would be posted at one of the intersections prior to accessing the Roberts Bay Road. These improvements, along with regrading and other site-specific improvements associated with construction of a new, two-phase recreation development at Roberts Bay, would likely significantly improve access and transportation conditions on the reservoir’s south side. In addition, Alternative C effectively limits

the number of recreation users at Roberts Bay, which would reduce the potential for traffic problems on the access road.

Mitigation and Residual Impacts [Alternative C]

No mitigation measures are proposed for Alternative C because the actions under this alternative are expected to improve transportation and access in the RMP study area or in the surrounding vicinity. Residual impacts could include modest increases in traffic associated with regional population growth.

Cumulative Impacts [Alternative C]

Cumulative impacts under Alternative C would be similar to those under Alternative A although Alternative C is the most proactive of the three in preparing for additional activity (future conditions) at the reservoir. Of particular concern is the segment of State Route 27 near Powder House Cove. This curving section of road built across a steeply sloping hillside will continue to serve as an overflow parking area for boaters unless a significant new day use facility is constructed as proposed in Alternative C.

