Chapter 2

Existing Conditions

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2.1 Natural Resources

2.1.1 Climate

The climate at Lake Cascade is dominated by Pacific high pressure systems between May and September, making summers at Lake Cascade (the peak recreational use season) generally warm and dry. It is not uncommon for the area to experience short periods of rainfall in June and early July. Rain typically begins to return again in September, but fall weather is mostly cool, sunny days and crisp, cold nights. During the winter, Aleutian low pressure systems bring moisture and cold temperatures, resulting in long, snowy winters. Warm winds from the south may cause temporary thawing for one or two weeks in January or February. The reservoir usually freezes in early December and completely thaws in April. Spring generally comes in late March and is typically cool and wet.

The mean annual air temperature is 40 degrees Fahrenheit (F), with extremes ranging from minus 40 to 100 degrees F. The mean temperature in January is 19 degrees F, and the mean temperature in July is 63 degrees F. During the summer, the average daily maximum is 78 degrees F.

The mean annual precipitation is 23 inches, most of which occurs during the winter in the form of snow. The mean annual snowfall is 107 inches, although 2 to 4 feet of snow are typically on the ground from December to March. The west side of the reservoir receives more snowfall than the east side because of the presence of and climatic influence of the nearby mountains and the associated ridgeline on the west side of the reservoir have on the area.

The prevailing winds are out of the southwest through the summer. During the winter, most winds blow from the northwest, especially with winter storms. Summer thunderstorms are quite common with at least half a dozen occurring during the summer months. The water at Lake Cascade can be extremely rough and dangerous within minutes of a storm's approach, requiring boaters to seek refuge along the shoreline as quickly as possible. It is during these stormy conditions when public access to docks is particularly critical. This is less of an issue within the northern arms of the reservoir, which are more sheltered from wind.

2.1.2 Topography

From the reservoir's water surface elevation of 4,828 feet above sea level, land to the west of the reservoir quickly rises to elevations ranging between 7,000 and 7,800 feet. Lone Tree Peak reaches 7,835 feet and is the site of the proposed WestRock resort (refer to Section 3.3.2 for further discussion). The highest peak in the West Mountain Range is Snowbank Mountain at 8,322 feet, located just southwest of the reservoir. The terrain to the north, east, and south of the reservoir is relatively flat, with the exception of the Crown Point area immediately north of the City of Cascade. This peak, referred to as Crown Point or Cas-

cade Peak, reaches 5,505 feet in elevation (Reclamation 1991).

Along most of the shoreline, the land gently slopes into the reservoir. Exceptions to this include Crown Point, portions of the tributary arms in the northeast part of the reservoir, isolated locations along the southeast shoreline, and part of Sugarloaf Island's shoreline. In these areas, the shoreline embankment is generally 15 to 20 feet above high water. A considerable amount of land remains wet throughout much of the peak use season because of low slopes and poor drainage. The reservoir bathymetry (or underwater terrain) is also gently sloping, particularly along the southwest and central shorelines and the upper reaches of the northern arms.

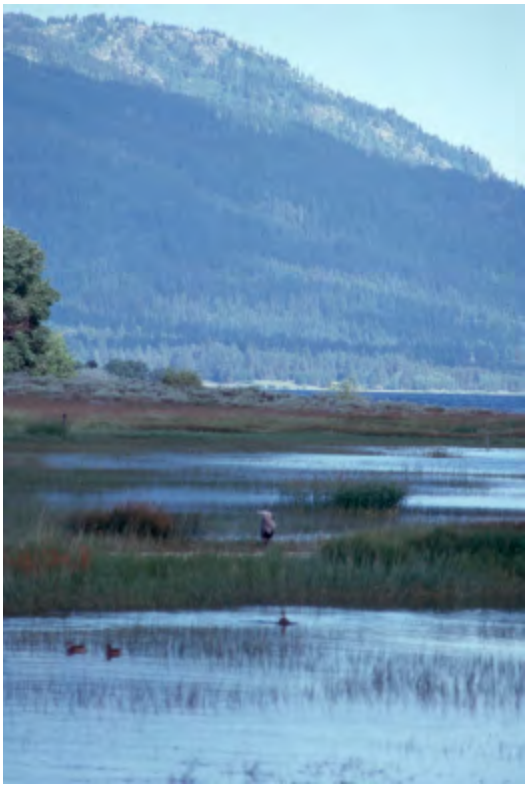

Photo 2-1. Lake Cascade and Surrounding Terrain

2.1.3 Hydrology

Lake Cascade is located on the North Fork of the Payette River. A number of streams and creeks drain into the reservoir (Figure 2.1-1). The major tributaries, Lake Fork Creek, Gold Fork River, Boulder Creek, and Willow Creek, enter from the northeast. Numerous smaller creeks descend from the ridgeline of West Mountain.

The North Fork of the Payette and its major tributaries flow through Long Valley, north of the reservoir. The stream channels are constantly changing, as shown by the numerous oxbows. Through the reservoir, the old river channel hugs the northwest shore, passes near Sugarloaf Island, and continues closely around Crown Point to the dam.

The reservoir water level reaches its highest level in June or July (4,828 feet) and is drawn down through the summer and into fall, to a mean annual low of 4,816 feet, thereby exposing large areas of mudflats in the flat valley. In the Hot Springs and Duck Creek areas, these mudflats extend thousands of feet from the high water shoreline. Mudflats also appear late in the season above Tamarack Falls Bridge, the confluence of Willow and Boulder creeks, and the old highway embankment across the Gold Fork Arm. Poor drainage and high water tables are prevalent along the west shoreline, the south end of the reservoir, the shoreline east of Sugarloaf Island, and in smaller areas where the terrain is essentially flat with poor draining soils or at elevations below the high water line.

2.1.4 Water Quality

Water quality at Lake Cascade has been a subject of public concern since the 1970s, when noxious algal blooms, aquatic weeds, and fish kills began to occur quite frequently (IDEQ 1996). Because of poor water quality, none of the beneficial uses of the reservoir were fully supported during 1993 and 1994 (IDEQ 1996). As a result, the Idaho Department of Environmental Quality (IDEQ) initiated the Total Maximum Daily Load (TMDL) process to comply with Section 303(d) of the Clean Water Act of 1977 (40 CFR 130.7). The reservoir was listed in 1996 as "water quality limited" because of violations of water quality

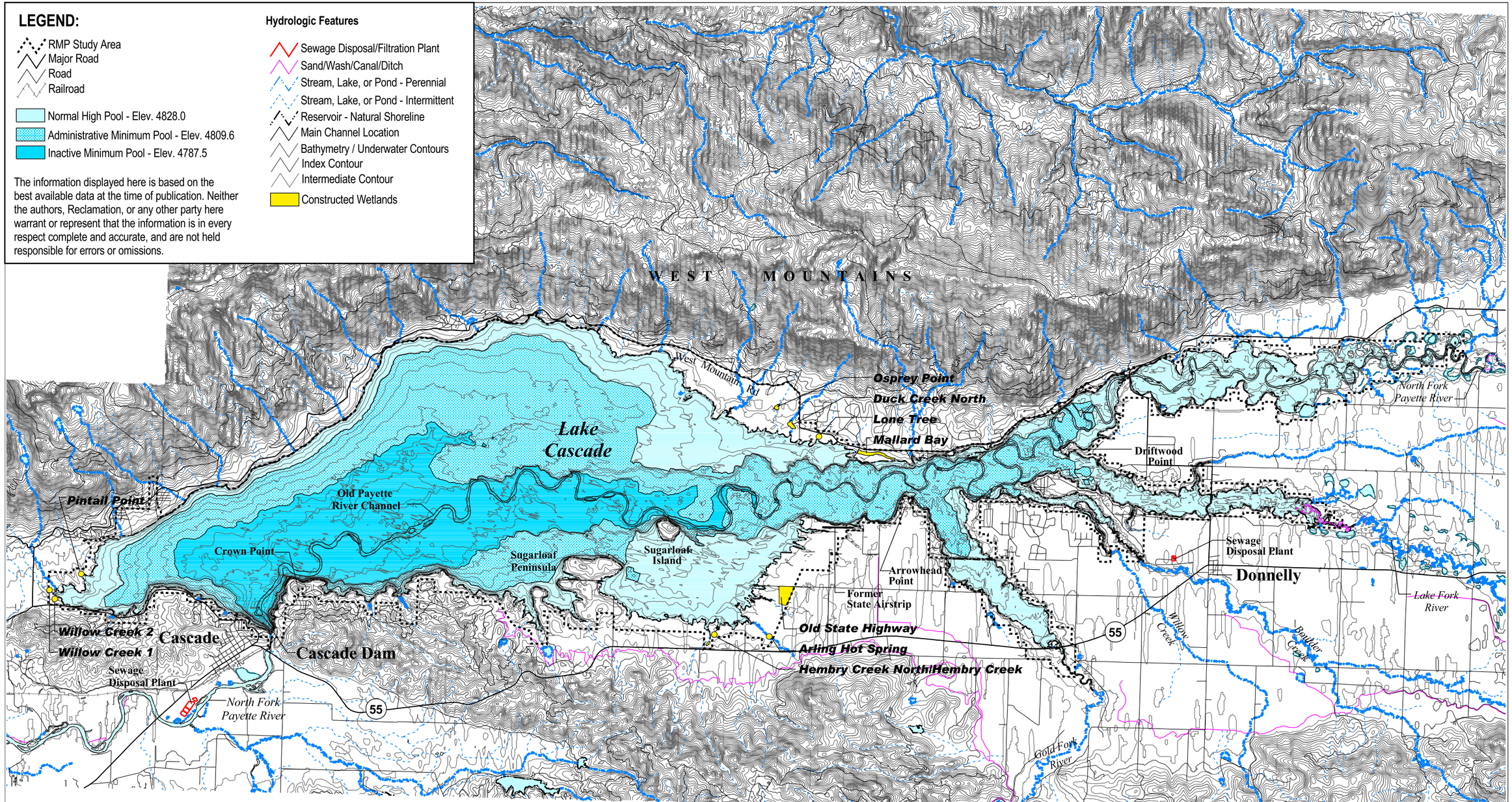

Figure 2.1-1

Topography and Water Features

Source: USBR, 2000; EDAW, 2001

P: 8E317.01/GIS/APR/C_RMP_2.APR

standards for nutrients, dissolved oxygen, temperature, and pH. Violating the water quality standards had several direct, observable consequences to the reservoir. Nutrient enrichment, including phosphorous, caused excessive algal growth. The potential for winter fish kills increased because of oxygen depletion under ice cover (Bender 1997). Another concern has been bacterial contamination of water for swimming (Bender 1997). A significant low point in water quality occurred in September 1993, when 23 cattle died from ingesting toxic algae in the reservoir. A public health advisory was issued warning the public to avoid contact with the reservoir (Shepard 1995).

Agencies and the community have actively worked toward improving water quality to attain full support of all beneficial uses, and have a goal to meet all water quality standards. The 1991 RMP contained provisions to improve water quality within Reclamation's jurisdiction. Specifically, it included provisions for improving sanitation at waste management sites, prohibiting the use of chemicals on Reclamation lands, and committing to follow the recommendations from the Valley County Soil Conservation District's Cascade Reservoir Watershed Project.

In 1992, a citizen's group formed an interagency task force to address water quality issues throughout the watershed, known as the Cascade Reservoir Coordinating Council (CRCC). This group became the state-designated Watershed Advisory Group (WAG) for the TMDL process in 1995. The WAG, which represents nine sectors of the local community, has worked closely with IDEQ and the Technical Advisory Committee (TAC), which is composed of agency, industrial, and municipal scientists and engineers) to develop draft TMDL standards. The Cascade Reservoir Phase I Watershed Management Plan was published in January 1996 (IDEQ). In August 1997, results of a Cascade Reservoir Water Quality Modeling Study were published by Reclamation "to develop predictive water quality models to assist in identifying and evaluating operational and structural measures for improving water quality" (Bender 1997). In April 1998, the TMDL Phase II Agricultural Source Plan was released (IDEQ 1998b), followed by the Phase II Watershed Management Plan in December 1998 (IDEQ 1998a).

The TMDL Implementation Plan, which is the next IDEQ plan scheduled for release, will identify what specific measures will be taken to achieve a targeted 37% reduction of phosphorus loads. The primary sources of pollutants are from point and nonpoint source pollution. The following two point sources were identified in the Phase II Watershed Management Plan: McCall wastewater treatment plant, and the Idaho Department of Fish and Wildlife (IDFG) fish hatchery in McCall (IDEQ 1998a).

The major sources of nonpoint pollution include the following: management practices by forestry, agricultural, and urban and suburban areas; and internal recycling of nutrients within the reservoir (IDEQ 1998a).

A Phase III Watershed Management Plan will be prepared to evaluate progress toward attainment of water quality standards and designated beneficial uses. This report is expected in December 2003.

To improve water quality, Reclamation has constructed approximately 68 acres of wetlands on Reclamation lands to treat water flowing into Lake Cascade from several tributaries. This includes two on the north end of the reservoir, three on the east side, three on the southern end, and four on the west side (Table 2.1-1 and Figure 2.1-1). Generally the wetlands on the southern half of the reservoir are associated with open grassy areas with few trees. In comparison, the areas adjacent to the wetlands on the northern half of the reservoir contain more tree and shrub vegetation. The wetlands receive and treat more than 1,100

Table 2.1-1. Constructed Wetlands at Lake Cascade.

Name of Wetland	Location	Acres
1. Old State Highway Box Culvert and Weirs (Phase 1)	East central side of the lake	31
2. Old State Highway (Phase 2)	East central side of the lake	Total acreage included in #1 above
3. Arling Hot Springs	East side of the lake	1
4. Hembry Creek North	East side of the lake	4
5. Hembry Creek	East side of the lake	4 (3 ponds)
6. Willow Creek	South end of the lake	1
7. Willow Creek No. 2	South end of the lake	1.5
8. Pintail Point	Southwest side of the lake	2
9. Osprey Point	West side of the lake	3
10. Duck Creek North	West side of the lake	5
11. Lone Tree	West side of the lake	1 (3 ponds)
12. Mallard Bay	West side of the lake	14
Total Acreage		67.5

Source: pers. comm., S. Dunn, Reclamation 2000.

acre-feet of flow and runoff from more than 17,000 acres of agricultural and forest land (IDEQ 2000).

These wetlands are intended to accomplish the following: (1) trap and remove sediment; (2) uptake and release phosphorous in a cycle; (3) provide stream stabilization; and (4) provide wildlife food, cover, nesting, and resting habitat values (Stiles 1999). Reclamation conducted a monitoring program from 1996 through 1999; results of the monitoring indicate that the wetlands have, for the most part, successfully reduced the net pollutants entering the reservoir from these tributaries (Stiles 1999).

Reclamation scientists measured suspended sediment and three types of phosphorous at the inlet (tributary) and outlet (wetland result) at each site. In 1997, the Hembrey Creek sites had net reductions for all pollutants. The other sites had mixed results (Stiles 1999). As the wetland communities became more established in 1998, the pollutant reduction improved. All sites had a net reduction in pollutants, except for the Hembrey Creek site (Stiles 1999). These wetlands are expected to be part of the long-term plan for reducing pollutant loads to the reservoir.

2.1.5 Geology

Lake Cascade is located near the transition of the Columbia-Snake Intermountain Province and the Northern Rocky Mountains. The Salmon River Mountains surround the site. The Lake Cascade area has two dominant geologic features:

- Idaho Batholith—Consists of a large intrusive complex of igneous rocks formed from 40 to 100 million years ago.
- Columbia River Basalt—Found throughout western Idaho, eastern Oregon, and Washington. The Columbia River Basalts erupted from fissures to the west and formed an extensive plateau that lapped onto the western edge of the Idaho Batholith.

Rocks of the Idaho Batholith consist primarily of coarse-grained granitic rocks such as granodiorite and quartz diorite. Near the western edge of the batholith, existing rocks were metamorphosed into schists and gneisses by intrusion of the batholith. Large portions of West Mountain are composed of these metamorphic rocks (Mitchell and Bennett 1979).

Rocks of the Columbia River Basalt group consist of Miocene-age (5 to 17 million years old) basalt flows that are thousands of feet thick (Fitzgerald 1982). Basalt is visible at the surface north of Cascade Dam near Crown Point, and northeast of the reservoir near Hot Spring Creek (Mitchell and Bennett 1979).

The structural geology is dominated by the Long Valley Fault System, referred to as the Western Idaho Fault Zone by Knudson et al. (1996). This fault zone formed north-trending linear valleys and mountain ridges in west central Idaho. Lake Cascade is located in a

structural graben (valley) formed by down-dropping along the Long Valley Fault. Sedimentary basin fill in the area is more than 7,000 feet deep as a result of downfaulting of the valley floor. The steep, linear mountain front along West Mountain was formed by uplift on the Long Valley fault that began between 14 and 10 million years ago.

The north-trending bedrock ridge in which Cascade Dam is built is also an uplifted fault block bounded on the east by the Cascade Fault. The Columbia River Basalt flows have been offset by faulting and tilted westward up to 30 degrees in the area (Schmidt and Mackin 1970). Remnants of basalt have been mapped in the floor of the valley, as well as on top of West Mountain. The total offset of the basalt flows across the Long Valley Fault is as much as 10,000 feet. The southern segment of the Long Valley fault near Lake Cascade is considered inactive. However, the northern part of the fault northwest of Donnelly is considered to be potentially active (Knudsen et al. 1996).

The surface geology of the study area consists primarily of glacial moraine (large rock and gravel bars) and outwash deposits, and a few lake deposits (Schmidt and Mackin 1970). Glaciers that advanced down from the crest of West Mountain deposited moraines and outwash along the southwest edge of the reservoir area. Moraine deposits typically consist of unsorted and unstratified boulders, sand, silt, and clay, whereas outwash is reworked moraine deposits that consist of crudely stratified cobbles, sands, and silts. Much of the valley surrounding Lake Cascade is filled with glacial outwash. Some of these outwash terraces have since been incised by more recent stream activity. These streams, including the North Fork of the Payette River, Lake Fork Creek, Boulder Creek, and the Gold Fork River, deposited younger sandy and gravelly alluvium in the incised valleys. The geomorphic expression of these cycles of deposition and erosion are flat-bottomed valleys, with progressively higher "benches" separated by relatively steep scarps. These geomorphic features are most prominent along the northern parts of the reservoir.

Lacustrine deposits of the Latah Formation are mapped along the eastern side of the reservoir area (Schmidt and Mackin 1970). These deposits consist of stratified silt and clay overlying basalt flows. Other surficial deposits include alluvial fans and colluvium deposited on slopes on West Mountain. These deposits typically consist of gravel, sand, and silt derived from the granitic rocks on West Mountain.

Mineral resources include mainly sand and gravel. Prospecting for gold and radioactive placer deposits has occurred in the past in the area (Schmidt and Mackin 1970). There are numerous hot springs located in the vicinity. These springs appear to be fault-controlled, where heated water rises along the fault planes (Wilson et al. 1976).

A basalt quarry is located near Crown Point, above the nearby campground. Material from this quarry was used as a source of crushed rock and riprap for construction of Cascade Dam and by the County for road construction. The quarry is not currently in use full time, only occasionally for operational needs (e.g., repairs on the dam). Reclamation will continue to need this quarry as it is their sole source for nearby rock materials (pers. comm., J. Budolfson, Snake River Area Office Resource Manager, Reclamation, Boise, ID, October 12, 1999).

2.1.6 Soils and Shoreline Erosion

The RMP Study Area lies entirely within the Idaho Batholith, a body of congealed molten rock (igneous) covering almost 20,000 square miles in northern and central Idaho. Basalt, a crystalline rock of volcanic origin, overlies eroded border rocks of the Idaho Batholith along the entire western boundary of Valley County. Rocks from these formations consist

of different types of granite and mica that are typically highly weathered and decomposed.

The parent materials for reservoir shoreline area soils are generally granitic rock with local areas of sandy alluvium and areas of glacial outwash, composed of uncemented beds of sand and gravel. The outwash areas are generally found on the reservoir's east shoreline, north of Sugarloaf Island, while the alluvium overlying the granitic rock is south of Sugarloaf. The reservoir's west shoreline also consists of alluvium and glacial outwash.

These geologic materials typically produce coarse-textured soils. The Natural Resources Conservation Service's (NRCS 1981) general soils map shows five map units abutting the reservoir's shoreline. The map units indicate the following diverse soil conditions:

- Slopes vary from flat to steep;
- Soil depths vary from moderate to very deep; and
- Drainage is poor to excessive.

Uncontrolled recreation, vehicular use, and grazing in some riparian corridors have eliminated vegetation and caused considerable erosion. Excessive instream erosion has also been caused by reservoir backwater effects during high water in the early summer. The Valley Soil Conservation District, through the Cascade Reservoir Watershed Management Plan, has identified riparian-lined streams draining into the reservoir (IDEQ 1998b).

Reclamation (1998) estimated in 1995 that 10,329 acre-feet of sediment had been deposited in the reservoir since November 1947. This volume represents a 1.47% loss of the total storage capacity of the reservoir and an average yearly loss of 216 acre-feet of storage.

Shoreline erosion continues to be a serious problem, raising concerns about potential building, structure, and dock loss; public safety; and visual impacts. Reclamation continues to work with private property owners to address shoreline erosion concerns on their property. In general, shoreline erosion is confined to the reservoir's east shore, where wind-generated wave action has created 5- to 50-foot vertical cliffs in some areas. Large waves (4 to 6 feet) are common during severe storms on the reservoir because of the combination of the prevailing southwest and northwest wind patterns, the shallow nature of the reservoir, and its north/south orientation. Areas where shoreline encroachment is of particular concern include the Cabarton Recreation Area, from Van Wyck Park to the dam, and residential areas starting south of Arrowhead Point and proceeding north into the Boulder Creek and Lake Fork arms of the reservoir. Unusual storm events have also resulted in erosion at Huckleberry Campground, the only point where shoreline erosion is an issue on the west side of the reservoir (Reclamation 1991b).

The occurrence of shoreline erosion is most frequent during the early summer when reservoir water levels are at a maximum and summer storms and waves have the greatest erosive impact on the vertical slopes. Other factors that partially contribute to shoreline erosion include large wakes from boats in confined reservoir areas during high water, and uncontrolled off-road vehicle (ORV) use (Reclamation 1991b).

Photo 2-2. Shoreline Erosion

The extent of vertical and horizontal erosion is highly variable along the east shore. In gen-

eral, erosion is most serious in the alluvium and glacial outwash soils that extend along the upper two-thirds of the reservoir's eastern shoreline, where hard rock underlies these soils. In contrast, the southern third of this shoreline is generally composed of granitic soils underlain by rock that would eventually stop the erosion process.

Residents have indicated that certain shoreline areas have been cut upland from 10 to 60 feet during the past 10 to 20 years. A 1991 review of the 1974 shoreline survey also revealed that the height of the erosion point or scarp in several areas had also increased noticeably during the same time period (Reclamation 1991b). Areas where scarp height is greatest include the following:

- Cabarton area
- The area just south of the dam
- Several areas just north of Crown Point
- Sugarloaf Peninsula
- Immediately south of Arrowhead Point
- Many areas in the Boulder Creek and Lake Fork arms of the reservoir

Although many shoreline erosion control measures have been attempted by adjacent private property owners, a large percentage of past efforts have not been successful. Reclamation continues to receive requests for permits to construct retaining walls and other erosion control structures, as well as permits to maintain existing structures. The quality of erosion control efforts by private property owners is improving as they seek advice from Reclamation and the U.S. Army Corps of Engineers (COE).

Reclamation has also installed erosion control structures at several locations around the reservoir. Logs are buried along the shoreline at Huckleberry Campground to reduce erosion on the gently sloping shoreline. Rock gabions were installed along the shoreline at the Boulder Creek Day Use Area. Steel pilings were installed at the concrete slab at Crown Point Campground as a temporary solution for erosion undermining the slab.

2.1.7 Vegetation

The following four major vegetation cover types are found near Lake Cascade: (1) wetlands and riparian communities; (2) grassland/pasture; (3) upland shrub; and (4) conifer forest. Numerous plant communities are found within each of these major cover types, as discussed below.

Wetlands and Riparian Cover Types

Wetlands and riparian communities perform many important ecological functions, including improved water quality, flood control, shoreline stabilization, contribution to groundwater recharge and streamflows, primary production in the food chain, and wildlife and fish habitat (Sather and Smith 1984). In addition, they also provide social benefits as natural areas for aesthetic, recreational, and educational opportunities.

A variety of Federal and state regulations require consideration of wetlands during construction and other activities. The most substantial of these regulations are the Clean Water Act (especially Section 404, which requires a permit for wetland disposal of fill and dredge material), the National Environmental Policy Act (NEPA), the Idaho Lake Protection Act, and the Stream Channel Protection Act. All Federal agencies are subject to these regulations.

Wetland and riparian communities, as defined for the purposes of this RMP, include shallow and deep marshes; wet meadows; and forest, shrub, and herbaceous riparian communities. These areas are mapped according to the primary vegetation types without regard to whether or not the area meets the COE criteria for jurisdictional wetlands under Section 404. This approach was used because the major vegetation types of wetlands and riparian

communities typically define the area's habitat value for fish and wildlife, which is an important consideration of the RMP. General boundaries of wetland and riparian communities were established during a vegetation mapping program conducted for the USFS by Utah State University. Boundaries were delineated for this study using satellite imagery. Jurisdictional wetland boundaries would need to be delineated with special studies on a case-by-case basis as needed for projects resulting from this RMP.

Many of the wetland and riparian communities around Lake Cascade are directly supported by the water stored in the reservoir. Several wetlands have been developed specifically to improve water quality and develop wildlife habitat. Wetlands extend along much of the western shoreline, except near the Tamarack Falls Bridge.

This shore has a cover of rushes, sedges, various grasses (both wetland and upland species), and occasional clumps of other emergent wetland species such as cattails (*Typha latifolia*). The largest concentrations of wetlands along the western shore occur between Poison and Gibson creeks, and in the Willow Creek area at the southern tip of the reservoir.

Shallow marshes are quite extensive in the latter two locations and along the undulating shoreline of the upper arms of the reservoir, especially the North Fork.

Former river meanders of the North Fork, Lake Fork, and Gold Fork arms create a complex mix of wetland and riparian communities ranging from emergent wetlands and aquatic beds in oxbow sloughs to scrub-shrub bogs supported by springs or perched water tables to a variety of forest types (FWS 1990). These wetlands are interspersed by numerous wet meadows and upland forest and meadow areas. The bottomlands in the North Fork are covered primarily with sedges, rushes, grasses, and scattered groups of cattails, with willow (*Salix* spp.) swales among the meandering river channels and willows, alders (*Alnus* spp.), and aspens (*Populus tremuloides*) along the high water areas and tributaries. Wetlands are less extensive in the Lake Fork and Gold Fork arms, although the ends of these arms are heavily covered with willows. Wetlands occur along the more riverine sections beyond the terminus of the reservoir's normal maximum pool elevation in the Boulder Creek and Willow Creek arms.

Another large wetland is located in the Hot Spring Creeks/Sugarloaf area along the eastern shoreline between the old state airstrip and Sugarloaf Peninsula. In this area, a shallow marsh extends outward from the shore and is adjacent to wet meadows and grasslands. Other wetland areas are located in the two inlets south of Sugarloaf Peninsula and on the south side of Sugarloaf Island.

Wildlife Management Areas (WMAs) were officially designated at the locations of many of the larger wetland areas as a result of implementation of the 1991 RMP. Actions that have been undertaken on many of the WMAs include: fencing to exclude livestock from all areas not having a grazing right through an Agricultural Easement (AE), emergent wetland development at several sites noted below, and habitat improvement measures including planting and placement of nest boxes and platforms. With the exception of the AE areas, however, vegetation conditions on the WMAs have improved substantially since their establishment. Nevertheless, continued livestock grazing on the AE lands diminishes wildlife habitat values and other functions and values of wetland and riparian communities. Grazing and trampling in AE portions of wetlands destroy protective plant cover for nesting waterfowl and interfere with nesting. Along stream corridors, livestock grazing has eroded the shoreline and has added to water pollution.

Grasslands/Pasture and Denuded Areas

Grasses occur along the North Fork Arm in drier upland areas above high banks and on

gentle slopes leading up from the bottomlands of the reservoir. Ponderosa (*Pinus ponderosa*) and lodgepole pine (*P. contorta*) often occur in association with the shrubs and grasses in this area. Grasses also predominate in the upland areas of the Lake Fork and most of the Gold Fork arms and in the Crown Point area in association with open stands of lodgepole and ponderosa pine. Vegetation on Sugarloaf Island is an upland community of a mixture of grasses and sagebrush. There are a number of conifers on the north quarter of the island. Agricultural lands to the east and north of Lake Cascade are dominated by pasture grasses (Kentucky bluegrass [*Poa pratensis*] and timothy [*Phleum pratense*]), hay, and small grains.

Overgrazing by livestock in some AE areas has reduced and weakened vegetation. The problem is most severe in drier areas with low soil fertility where plant regeneration is difficult. Several areas around the reservoir that have a light cover of grasses, sagebrush (*Artemisia* spp.), and conifers have also been substantially denuded of vegetation, mostly by off-road vehicle use, especially in the area north of Cabarton to the dam. The lack of vegetation in other areas results from the infertility of the soils. These include the exposed sandy beaches and sand bars, as well as sparsely vegetated grass and shrub areas scattered around the reservoir. Reservoir drawdown zones are also generally devoid of vegetation. Areas above full pool need to be managed to prevent further deterioration and allow for rehabilitation. An annual grass/forb community consisting of a variety of weedy annual grasses and forbs colonizes portions of the reservoir drawdown zone during late summer. These annual species tend to occur in drawdown areas with shallow slopes and are especially common on the east side of the reservoir from Sugarloaf to the north. They occupy the largest areas during relatively dry water years.

Upland Shrub Cover Types

Shrub communities on the east side of the reservoir and drier portions of the west side are characterized by big sagebrush (*Artemisia tridentata*), low sagebrush (*A. arbuscula*), and antelope bitterbrush (*Purshia tridentata*). A variety of other shrubs such as ninebark (*Physocarpus malvaceus*), serviceberry (*Amelanchier alvifolia*), hawthorn (*Crataegus douglasii*), bitter cherry (*Prunus emarginata*), mountain ash (*Sorbus* spp.), and syringa (*Philadelphus lewisii*) are scattered throughout this community, especially as elevation and precipitation increase. Common grasses, sedges, and species that occur are listed in Table 2.1-2. The table is not a complete list of plants; it is only a representation of the more common species that occur.

Conifer Forest Cover Type

The lowest elevation forest stands around the reservoir are dominated by ponderosa and lodgepole pine with a grass/forb understory. There are few places on the west side of the reservoir where the forest cover extends all the way to the shoreline. Forested areas on the slopes of West Mountain are dominated by the species listed in Table 2.1-3. The predominant Douglas-fir (*Pseudotsuga menziesii*) community has a dense forest canopy, but some places support a dense understory of shrubs, which are also listed on Table 2.1-2. Forbs and grasses common to the other forest communities, described below, are also found here but are not as abundant.

A ponderosa pine/mixed shrub community is also located on the west side of the reservoir. This community has a fairly open forest canopy dominated by ponderosa pine, Douglas-fir, grand fir (*Abies grandis*), and some lodgepole pine. The shrub understory is comprised of common chokecherry (*Prunus virginiana*), snowberry (*Symphoricarpos* sp.), syringa, mountain ash, shinyleaf spirea (*Spiraea betulifolia*), bitter cherry, and buckbrush (*Ceanothus*). Stands of quaking aspen (*Popu-*

Table 2.1-2. Upland Shrub Cover Type Species.

Common Name	Scientific Name
Grasses and sedges	
Bluebunch wheatgrass	*Agropyron spicatum*
Western wheatgrass	*Agropyron spicatum*
Idaho fescue	*Festuca idahoensis*
Needle-and-thread grass	*Stipa comata*
Sandberg's bluegrass	*Poa secunda*
Elk sedge	*Carex geyeri*
Ross sedge	*C. rossii*
Forbs	
Arrowleaf balsamroot	*Balsamorhiza sagittata*
Pacific trillium	*Trillim ovatum*
Penstemon	*Penstamon deustus*
Lupine	*Lupinus* spp.
Fireweed	*Epilobium angustifolium*
Indian paintbrush	*Castilleja* spp.
Tapertip hawksbeard	*Crepis acuminata*

Sources: Reclamation 1991a, Alexander 1998, and Steele and Geier-Hayes 1995

lus tremuloides), Rocky Mountain maple (*Acer glabrum*), alder, and red-osier dogwood (*Cornus stolonifera*) are common in the moister gullies. In the more open areas, forbs such as arrowleaf balsamroot, bracken fern (*Pteridium aquilinum*), and a variety of grasses also occur.

Along the arms of the reservoir, lodgepole pine and ponderosa pine are the dominant forest species where forest cover occurs. Sugarloaf Island supports conifers on the northwest edge. Reclamation lands in the Crown Point area are moderately forested with young and mature ponderosa pines and other conifers.

An open pine forest is common on the slopes and hills on the east side of the reservoir. This forest is characterized by a widely dispersed, open tree canopy of ponderosa pine on the drier sites and of lodgepole pine on the wetter sites. Many of the shrubs, forbs, and grasses described above also dominate this community; however, shade-tolerant or moisture-requiring shrubs such as wild rose (*Rosa woodsii*), ninebark, chokecherry, snowberry, elderberry (*Sambucus cerulea*), and syringa are more numerous.

Overall, the amount of forest on Reclamation lands is limited. However, some of the forested areas contain diseased and dead trees that pose higher-than-normal fire hazards. Generally, these are lodgepole pines and ponderosa pines infested by western gall rust. The greatest concentration of dead and dying

Table 2.1-3. Conifer Forest Cover Type Species.

Common Name	Scientific Name
West Slope Forested Areas	
Douglas-fir	*Pseudotsuga menziesii*
Grand fir	*Abies grandis*
Englemann spruce	*Picea engelmannii*
Western larch	*Larix occidentalis*
Ponderosa pine	*Pinus ponderosa*
Lodgepole pine	*Pinus contorta*
Quaking aspen	*Populus tremuloides*
Dominant Douglas-Fir Community	
Ninebark	*Physocarpus malvaceus*
Rocky Mountain maple	*Acer glabrum*
Western serviceberry	*Amelanchier alvifolia*
Common snowberry	*Symphoricarpos albus*
Mountain-ash	*Sorbus* spp.
Shinyleaf spirea	*Spiraea betulifolia*

Sources: Reclamation 1991a, Alexander 1998, and Steele and Geier-Hayes 1995

trees is in the Boulder Creek Arm. During the last 5 years, Reclamation has contracted for commercial thinning and slash burning in infested areas. Dead and dying trees have not been made available to the public as firewood because of the lack of staffing necessary to monitor woodcutting areas and the required burning of slash piles left by woodcutters.

Rare, Threatened, and Endangered Plant Species

Two species considered rare by the Idaho Conservation Data Center occur about 2 miles west of the reservoir on land managed by the USFS, Payette National Forest. The tall swamp onion *(Allium madidum)* generally occurs between 3,000 and 6,500 feet elevation in vernally wet meadows, flats, draws, and gentle slopes along creeks and drainages. Populations occur in meadows and coniferous forest openings that are wet during the spring and dry to the surface by late summer or early fall. The species appears to be restricted to basalt-derived substrates. Some basalt-derived substrates are present on Reclamation lands, and the other habitat conditions may be suitable in some of the WMAs. However, no tall swamp onions are known to occur on Reclamation lands.

The giant helleborine *(Epipactis gigantea)* typically grows in moist meadows with scattered willows. It is associated with calcareous habitats throughout its range. Within the Rocky Mountains it is usually associated with warm springs. Wetlands in the Hot Springs Creek area may provide suitable habitat for this species. However, no giant helleborines are known to occur on Reclamation lands.

The Ute ladies'-tresses orchid (*Spiranthes diluvialis*) is the only Federally protected plant species that may occur near Lake Cascade. It typically occupies floodplains and wet meadows with little overhanging shrub or tree canopy. Ute ladies' tresses orchids have been found in southeast Idaho and eastern Washington and may occur in suitable habitats between these locations. No searches for this species have been conducted on Reclamation lands. Field surveys would need to be conducted at the sites of any future land-disturbing activities within wetlands or riparian communities on Reclamation lands.

2.1.8 Fish and Wildlife

The Idaho Department of Fish and Game (IDFG) and the U.S. Fish and Wildlife Service (FWS) assist Reclamation in managing fish and wildlife resources. The Fish and Wildlife Coordination Act, the Endangered Species Act, and the NEPA provide authority and guidance for Reclamation as a Federal agency to protect, conserve, and enhance wildlife and fisheries resources.

Fish

Lake Cascade is one of three Reclamation impoundments in the Payette River Basin and was formed by damming the North Fork Payette River. The reservoir provides a mixed fishery (both cold water and warm water species) and is one of the most heavily fished waters in the state (IDFG 1996). In addition to recreational benefits, the reservoir fishery is also the main source of prey for eagles, ospreys, otters, and other wildlife. Associated with the reservoir are the fisheries resources of its four main tributaries, the North Fork Payette River, the Lake Fork River, Gold Fork River, and Willow Creek. These tributaries, along with numerous smaller ones, also provide recreational fishing opportunities as well as forage for local wildlife.

Reservoir Fishery

Lake Cascade is a heavily used mixed fishery. The primary species found in the reservoir are listed in Table 2.1-4.

Trout and salmon populations are supplemented through stocking programs by IDFG (pers. comm. D. Anderson, Fishery Manager,

Table 2.1-4. Game and Non-Game Fish Species Found in Lake Cascade.

Common Name	Scientific Name
Cold Water Game Species	
Hatchery rainbow trout	*Oncorhynchus mykiss*
Redband trout	*Oncorhynchus mykiss gairdneri*
Kokanee salmon	*Oncorhynchus nerka kennerlyi*
Coho salmon (land locked)	*Oncorhynchus kisutch*
Mountain whitefish	*Prosopium williamsoni*
Warm Water Game Species	
Smallmouth bass	*Micropterus dolomieui*
Black crappie	*Pomoxis nigromaculatus*
Tiger muskie (sterile northern pike hybrid with muskellunge)	*Esox lucius x E. Masquinongy*
Yellow perch	*Perca flavenscens*
Channel catfish	*Ictalurus punctatus*
Black bullhead	*Amerurus melas*
Brown bullhead	*Amerurus nebulosus*
Pumpkinseed	*Lepomis gibbosus*
Non-Game Fish	
Northern pikeminnow (formerly called northern squawfish)	*Ptychocheilus oregonensis*
Large-scale sucker	*Catostomidae macrocheilus*

Source: Simpson and Wallace 1978

IDFG, McCall, Idaho, April 26, 1999). At one time, the reservoir had some of the most productive yellow perch (*Perca flavescens*) fishing in the state, with perch comprising over 75% of the total annual catch in the reservoir. Since 1996, however, perch have almost disappeared from the reservoir. IDFG has conducted studies to determine the cause of the population decline and determined that the primary reason has been due to predation on the perch by pikeminnow (*Ptychocheilus oregonensis*) and suckers (*Catostomidae macrocheilus*) (IDFG 2000). In spring 2001, IDFG initiated efforts to reduce these species by installing fish weirs (traps) at specific reservoir tributaries to trap and stop them from entering Lake Cascade. All of the trapped pikeminnow and suckers will be removed from these waterways, thereby reducing these populations and hopefully allowing for the increase in the perch population over time (McCall-Times Advocate, May 9, 2001).

Lake Cascade is open to fishing all year. Sport fishing activity focuses primarily on rainbow trout (*Oncorhynchus mykiss*) during spring and fall. Summer and winter fishing formerly focused on perch. However, since perch populations have declined, summer fishing is now focused on other warm water species. Winter fishing opportunities on the reservoir are limited since the decline of the perch fishery.

Spawning conditions for warm water game and non-game fish in the reservoir are generally good. Shoreline gravels, rocks, and vegetation usually remain inundated long enough for spawning, egg development, and fry emergence to occur. The cold water species and some non-game species, such as the northern pikeminnow, primarily spawn in the tributaries.

Lake Cascade has the potential to provide good rearing habitat for both warm and cold water fish. The reservoir inundates a broad, flat valley and has relatively flat underwater topography. The existing shallow profile of the reservoir is exaggerated by periodic drawdowns. Even with annual fluctuations, the large, shallow shoreline zone is productive for benthic organisms and some aquatic vegetation. However, this high productivity, coupled with the shallow reservoir profile and watershed-wide nutrient inputs, has resulted in periodic poor water quality conditions in the reservoir. The primary hazards to fish as a result of the poor water quality are low dissolved oxygen levels during winter and summer months, and elevated water temperatures in

the late summer. Section 2.1.4, Water Quality, has a complete description of these issues.

Low oxygen levels and elevated temperatures are believed to be the contributing factors to fish kills that have periodically occurred in the reservoir. These fish kills have included rainbow trout, coho salmon (*O. kisutch*), and yellow perch. As previously discussed, the most recent substantial fish kill occurred in 1994, when a large number of juvenile yellow perch died. Since then, no strong recruitment of yellow perch has been documented (pers. comm. D. Anderson, Fishery Manager, Idaho Department of Fish and Game, McCall, Idaho, April 26, 1999).

Space limitations as a result of the reservoir drawdowns are also a concern for the reservoir fishery. Reservoir drawdowns result in a limited area for fish, limiting habitat for refuge from extreme conditions. Low reservoir levels and low late summer flows in the main tributaries can limit fish access to refuge areas in these tributaries, where water is more highly oxygenated and possibly cooler (pers. comm. D. Anderson, Fishery Manager, IDFG, McCall, Idaho, April 26, 1999). Also, because the average depth of the reservoir is only about 25 feet at full pool, low reservoir levels can result in depths of only a few feet throughout much of the reservoir. This limits the amount of cool water habitat in late summer and can result in areas of stagnant water with low oxygen levels, particularly in the southern portion of the reservoir (pers. comm., T. Dombrowski, IDEQ, Cascade, Idaho, April 23, 1999).

Currently, Reclamation maintains a minimum pool of 293,956 acre-feet during the winter under an administrative decision. This minimum pool level was developed in response to IDFG research results and is intended to minimize winter oxygen problems (D. Anderson, Fishery Manager, IDFG, McCall, Idaho, April 26, 1999).

Tributary Fishery

Like Lake Cascade, the tributaries provide recreational fishing opportunities, forage for wildlife, and important spawning and refuge habitat for the cold water species of the reservoir. Species from the reservoir using the tributaries for rearing and spawning include rainbow trout, coho and kokanee salmon (*O. nerka*), and northern pikeminnow. Warm water reservoir species may also occasionally be found in the tributaries, but their use is probably limited. The main tributaries also have resident populations of cold water species, which include rainbow trout, mountain whitefish (*Prosopium williamsoni*), and northern pikeminnow. It is also possible that one or more of these tributaries supports native populations of redband trout (a subspecies of rainbow trout), but this has yet to be verified (pers. comm., D. Anderson, Fishery Manager, IDFG, McCall, Idaho, April 26, 1999).

Unlike the reservoir, the major tributaries are closed to fishing during the spring and fall spawning period upstream of slack water reservoir areas. This closure protects spawning fish and helps maximize production from the tributaries.

The primary ecological problems associated with the reservoir tributaries are fish access to spawning and refuge habitat, water quality, and water quantity. Fish access is limited or blocked by irrigation diversions and road culverts on many of the tributaries. Water quality is impacted by forest and agricultural drainage, urban runoff, onsite waste disposal (septic tanks), and direct treated wastewater discharges from the McCall wastewater treatment plant and the fish hatchery. Water quantity is also impacted through agricultural diversions, since no minimum flows are currently established in any of the tributaries.

The Gold Fork River has the greatest potential for wild fish production in the Lake Cascade drainage. However, fish access to most of this river is blocked by an irrigation diversion lo-

cated 4 miles upstream of the reservoir. Habitat in small tributary streams is critical, especially when the reservoir water quality conditions become poor in late summer. Several tributaries of special habitat importance include the following:

- Willow Creek (at the south end);
- Hurd Creek;
- French Creek;
- Poison (Rock) Creek;
- Campbell Creek; and
- Van Wyck Creek.

Willow, Hurd, and Rock creeks probably have the greatest potential for salmonid reproduction of all the west side tributaries. Spawning in all of these (with the exception of Willow Creek) is limited to near-mouth areas because of the steep stream gradient and poorly strewn substrate. Fish also have difficulty passing through some road culverts.

Fisheries Management Considerations

Lake Cascade and its tributaries have the potential to provide excellent recreational fishing opportunities for a variety of species. However, several factors currently limit this potential. The primary factor is water quality in the reservoir and the tributaries. To address this issue, Reclamation has successfully implemented a higher winter minimum pool that may have minimized or eliminated winter fish kills. Maintaining a higher winter pool has been possible because of recent wet years. Reclamation has recently maintained summer minimum pools above the 293,956 acre-feet administrative pool agreement. For the tributaries in the watershed, IDEQ has instituted a draft TMDL requirement that should result in a 37% reduction in nutrient loading to the streams, and eventually the reservoir, over a 5-year period (IDEQ 1998a).

Access to spawning areas may also be an important limiting factor for reservoir and tributary fisheries. Currently, none of the diversions on any of the tributaries have fish ladders (the North Fork Payette River is the only major tributary without diversions), and none are currently proposed. In addition to access problems, these diversions (except one) are not screened. Fish that otherwise would be recruited to the reservoir or lower portions of the tributaries may be lost into irrigation canals. To address this issue, IDFG has recently completed a pilot screening project on Mulholland ditch. If this proves successful and cost-effective, some irrigation districts have expressed interest in screening projects (pers. comm., D. Anderson, Fishery Manager, Idaho Department of Fish and Game, McCall, Idaho, April 26, 1999).

Flow in the tributaries and into the reservoir can compound water quality and access issues. As stated above, no minimum flows are required in the tributaries, and overland return flow can constitute the majority of the streamflows during late summer. Overland return flow quickly reaches ambient air temperature and collects large amounts of nutrients.

Only some of the above issues are under Reclamation's management authority. Addressing all of the issues would require coordination among IDFG, IDEQ, Reclamation, and private landowners throughout the basin. The IDFG's general management objectives for waters in the Payette River Basin, which apply to Lake Cascade and its main tributaries, are listed in Table 2.1-5.

Wildlife

Six important WMAs are located around Lake Cascade. These are listed below and are shown on Figure 2.1-2: (1) Hot Springs Creek WMA (includes Sugarloaf Island); (2) Gold Fork WMA; Lake Fork WMA; North Fork Payette WMA; Duck Creek WMA; and Willow Creek WMA. These generally correspond with the WMAs established as part of the 1991 RMP.

Table 2.1-5. IDFG General Management Objectives for Waters in the Payette River Basin.

Objective	Program
Provide a diversity of fishing opportunities within the Payette River drainage.	Zone the stream areas to concentrate hatchery catchable stocking in locations where the highest return to creel would occur.
	Manage for wild trout where habitat and fish populations would sustain an acceptable fishery.
	Manage for increased catch rates and size in selected stream reaches using quality trout regulations.
	Stock appropriate strains of trout in natural production areas to better use the rearing capacity and provide larger and more desirable fish.
	Improve land use management by working with Federal, state, and private landowners on proper land uses to increase soil stability in the drainage.
Assess the potential for securing stream maintenance flows to protect fisheries on the North Fork Payette River, Lake Fork Creek, and other tributaries.	Gather needed biological and economic information for the Idaho Water Resource Board to justify pursuing stream maintenance flows for fish and wildlife protection.
Maintain riparian and floodplain values for fish and public access.	Work with Valley County and landowners to provide public access to the North Fork Payette River.

Source: IDFG 1996

The primary reason for establishing the WMAs was to preserve long-term, viable habitat for waterfowl, birds of prey, mammals, and other wildlife. This is accomplished by protecting important wildlife habitat and managing conflicting uses. Each WMA has an active Habitat Improvement Plan (HIP) that describes implemented or planned actions. These actions vary by WMA but typically include the following:

- Fencing to exclude livestock and vehicles;
- Habitat improvement measures;
- Information and education programs; and
- Development of facilities for compatible uses, such as Nordic skiing.

Several of these areas also include important habitats for bald eagles (*Haliaeetus leucocephalus*) as described in the Cascade Reservoir Bald Eagle Management Plan (BEMP) prepared by the FWS, USFS, and Reclamation in 1990 (USFS et al. 1990).

The WMAs also provide habitat, such as forage, shelter, and reproduction sites, for a number of other wildlife species. The most crucial, abundant, and sensitive of these habitats are the riparian areas and wetlands. The emergent vegetation, adjacent wet meadows, swales, mudflats, and sandbars are critical as nesting, feeding, and loafing habitat for waterfowl, shorebirds, and wading birds. FWS (1990) indicates that 151 species of birds, 47 mammal species, 8 amphibian, and 5 reptile species are found in the vicinity of Lake Cascade.

Birds

Generally, in dry climates, many studies have shown that as many as 80% of all wildlife species depend partly or wholly on wetland and riparian communities for their survival. A few of the many species of water-oriented birds reported inhabiting the Lake Cascade area during the breeding season or during migration are listed in Table 2.1-6. This is not a complete species list but represents the variety of water-oriented birds found at the reservoir. Lake Cascade is an important migration staging and resting area for water-oriented birds flying south in October. Birds generally flock in separate masses of 100 to 200 birds each according to species. Several of these species, such as dabbling ducks, feed on small grains harvested in fields east of the reservoir, then return to the reservoir for loafing. Shorebirds also use the area as a rest stop during migration. Because of its high elevation, Lake Cascade functions mainly for the initial congregation of migrating birds during the fall. Birds move quickly to lower elevation waters, such

Table 2.1-6. Water-Oriented Birds Inhabiting the Lake Cascade RMP Area.

Common Name	Scientific Name
Bald eagle	*Haliaeetus leucocephalus*
Several species of gulls	*Larus* spp.
American avocet	*Recurvirostra americana*
Osprey	*Pandion haliaetus*
Long-billed curlew	*Numenius americanus*
White pelican	*Pelecanus erythrorhynchos*
Mallard	*Anas platyrhynchos*
Pintail	*Anas acuta*
Western grebe	*Aechmophorus occidentalis*
Common merganser	*Mergus merganser*
American wigeon	*Anas americana*
Great blue heron	*Ardea herodias*
Common loon	*Gavia immer*
Black-necked stilt	*Himantopus mexicanus*
Tundra swan	*Cygnus columbianus*
Canada goose	*Branta canadensis*
Snow goose	*Chen caerulescens*
Killdeer	*Charadrius vociferus*
Lesser yellowlegs	*Tringa melanoleuca*
Spotted sandpiper	*Actitis macularia*
Wilson's phalarope	*Phalaropus tricolor*

Sources: Reclamation 1991a, FWS 1990, and Groves et al. 1997

as Lake Lowell, where larger congregations occur (Reclamation 1991a).

The largest wetland areas are located at Willow Creek, Mallard Bay, Hot Springs Creek, and the upper arms of the reservoir. Canada geese congregate around the Willow Creek and Mallard Bay wetlands in the spring and early fall. They also occur at the Hot Springs Creek wetlands, along with feeding herons. Canada geese (*Branta canadensis*) also feed extensively on the annual grasses and forbs that colonize portions of the reservoir drawdown zone during late summer and early fall. During spring migration, snow geese (*Chen caerulescens*) and tundra swans (*Cygnus columbianus*) use Sugarloaf Island and adjacent areas. Directly west of Sugarloaf on the western shore of the reservoir, the Mallard Bay wetlands support a colony of nesting western grebes (*Aechmophorus occidentalis*). Common loons (*Gavia immer*), a species of special concern that have similar habitat requirements as the western grebe, have also been sighted in this wetland, although no nests have been found, possibly because this species needs seclusion. Long-billed curlews (*Numenius americanus*), a more upland shorebird, were reported to nest in the area in 1991 (Reclamation 1991a).

Conversations with local agency biologists could not confirm if curlews still nest in the area. Pelicans (*Pelecanus* sp.) feed in the general vicinity of Mallard Bay and Hot Springs Creek, along with Canada geese and great blue herons (*Ardea heriodias*), during the spring, summer, and early fall. Most of these water-oriented birds are sensitive to disturbance during the nesting and rearing season between mid-March and the end of June.

The upper arms of the reservoir support the greatest abundance and diversity of wildlife because of the intermingled mosaic of habitat types. The flooded river meanders from an undulating shoreline with its many inlets, coves, channels, and edges, and few conflicting human activities. These areas provide the seclusion needed for especially sensitive species such as the common loon. Great blue herons have established a large rookery in a stand of lodgepole pines at the north end of the North Fork Arm; herons generally require

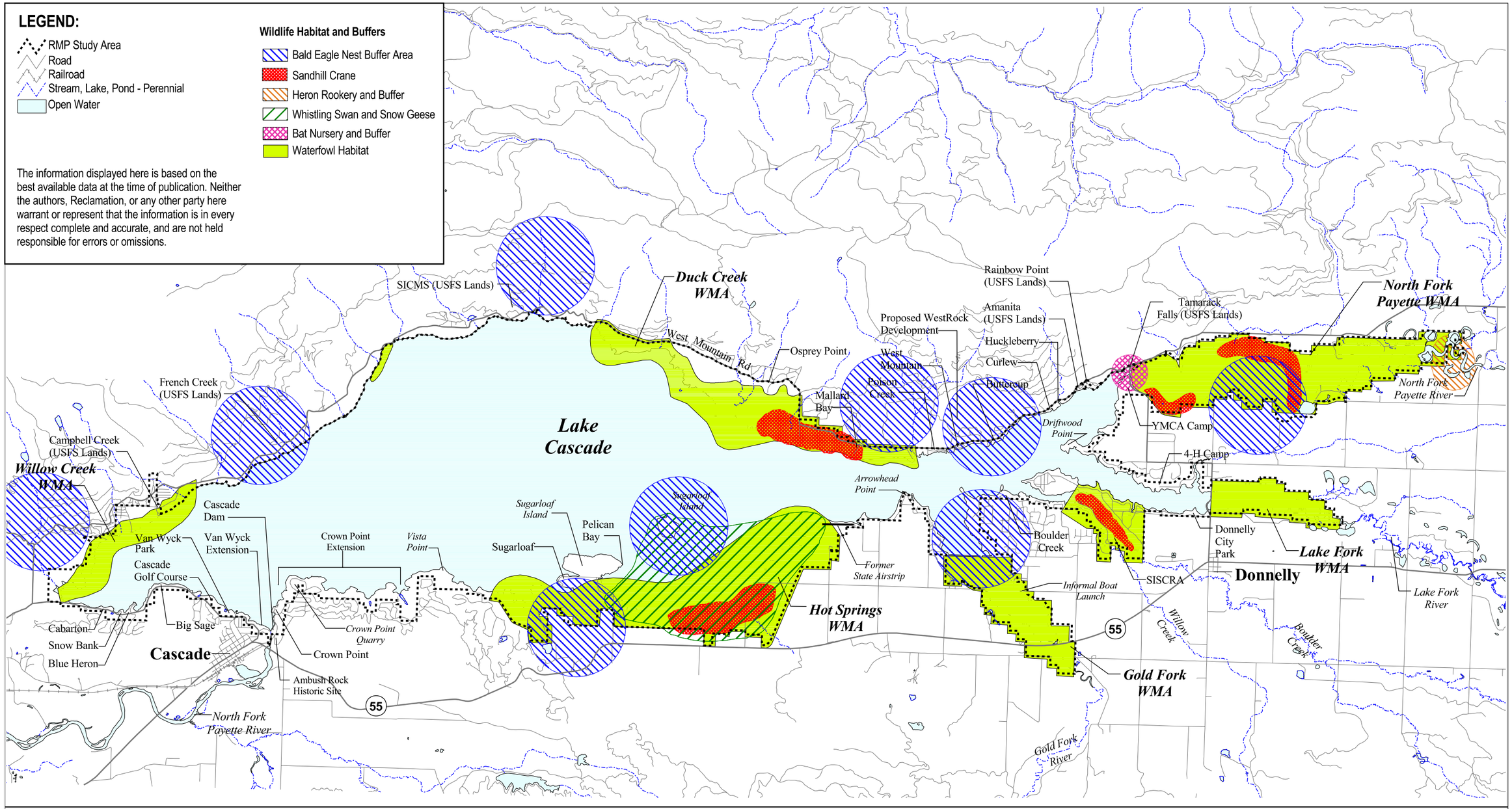

Figure 2.1-2

Primary Wildlife Habitat and Buffers

Source: USBR, 2000; EDAW, 2001

P: 8E317.01/GIS/APR/C_RMP_2.APR

an area with little or no disturbance within about 1/2 mile of their rookery. Water level fluctuations pose a problem for nesting waterfowl along the reservoir shoreline. Birds build nests along the waterline that may be flooded as water levels increase in the late spring. Habitat enhancement at the WMAs alleviates part of this problem by providing additional nesting habitat, but water level fluctuations will continue to pose problems along the shoreline. IDFG believes this problem can be solved by digging potholes along the high water line, or creating offshore islands and providing side channel ponds in the arms of the reservoir.

In addition to water-oriented birds, numerous neotropical migrants are common, especially in the upper arms of the reservoir. Species that may be observed in the area are listed on Table 2.1-7.

Blue (*Dendragapus obscurus*), ruffed (*Bonasa umbellus*), and spruce grouse (*D. canadensis*) occur in the forested mountain areas. The conifers west of the reservoir also provide suitable habitat for cavity-dependent birds species, such as pileated woodpecker (*Dryocopus pileatus*), Lewis' woodpecker (*Melanerpes lewis*), wrens (*Troglodytes* spp.), and nuthatches (*Sitta* sp.). Table 2.1-8 lists these forested-mountain and cavity-dependent species as well as the raptors commonly found in the Cascade area.

Lake Cascade raptor populations include great-horned owls (*Bubo virginianus*), especially in the upper arms of the reservoir. A few great gray owls (*Strix nebulosa*) also inhabit the area north of Donnelly along the east side of the reservoir throughout the year (pers. comm., L. Powers Biology Professor, Northwest Nazarine University, Nampa, Idaho, July 14, 1999). Dr. Powers indicated that three pairs consistently nested in this general area in the mid to late 1980s. However, in 1998, only one nesting pair was found following extensive efforts. Great gray owls need forest edges for hunting with dense timber stands nearby for thermoregulation and nesting. Powers suggested that habitat fragmentation resulting from summer home development and wood cutting has reduced the size and number of dense forest stands as well as the density of trees in remaining stands, thereby degrading habitat quality. Summer heat stress is also a problem for this species at relatively low elevations, especially as the dense forest canopy is opened.

Table 2.1-7. Neotropical Migrants Common in the Lake Cascade RMP Area.

Common Name	Scientific Name
Evening grosbeak	*Coccothraustes vespertinus*
Tree swallow	*Tachycineta bicolor*
Dipper	*Cinclus mexicanus*
Gray jay	*Perisoreus canadensis*
Western kingbird	*Tyrannus verticalis*
Dark-eyed junco	*Junco hyemalis*
Mountain chickadee	*Parus gambeli*
Vesper sparrow	*Pooecetes gramineus*
Chipping sparrow	*Spizella passerina*
Mountain bluebird	*Sialia currucoides*
Belted kingfisher	*Ceryle alcyon*
Steller's jay	*Cyanocitta stelleri*
Calliope hummingbird	*Stellula calliope*
Yellow-rumped warbler	*Dendroica coronata*
Yellow warbler	*Dendroica petechia*

Sources: Reclamation 1991a, FWS 1990, and Groves et al. 1997

Table 2.1-8. Other Bird Species Found at the Cascade Lake RMP Study Area.

Common Name	Scientific Name
Forested-Mountain Species	
Blue grouse	*Dendragapus obscurus*
Ruffed grouse	*Bonasa umbellus*
Spruce grouse	*Dendragapus canadensis*
Cavity-Dependent Species	
Pileated woodpecker	*Dryocopus pileatus*
Lewis' woodpecker	*Melanerpes lewis*
Wrens	*Troglodytes* spp.
Nuthatches	*Sitta* spp.
Raptors	
Red-tailed hawk	*Buteo jamaicensis*
Rough-legged hawk (during winter)	*Buteo lagopus*
Northern harrier	*Circus cyaneus*
American kestrel	*Falco sparverius*
Northern goshawk	*Accipiter gentilis*
Short-eared owl	*Asio flammeus*
Long-eared owl	*Asio otus*
Great-horned owls	*Bubo virginianus*
Great gray owls	*Strix nebulosa*
Osprey	*Pandion haliaetus*

Sources: Reclamation 1991a, FWS 1990, and Groves et al. 1997

One other raptor of particular interest at Lake Cascade is the osprey (*Pandion haliaetus*). Osprey numbers have increased considerably since Cascade Dam was completed and the reservoir filled. This expansion is the result of several factors, including prohibiting the use of long-lived pesticides, erection of nesting platforms, and a productive fishery in Lake Cascade. The first intensive surveys to determine osprey status were conducted between 1978 and 1980 (Van Daele et al. 1980). This study found that the valley area supported approximately 50 nesting pairs with approximately 30 nesting pairs observed in the immediate vicinity of the reservoir (Reclamation 1991a). By 1989, the number of nesting pairs had increased to over 90 with 69 pairs nesting at Lake Cascade. Although no firm count is available, as many as 90 pairs may nest in the immediate vicinity of the reservoir. Nesting concentrations are highest where artificial nesting platforms have been erected around the reservoir. Nests are built on snags (58%), live trees, power poles, and artificial platforms (20%) with concentrations in the Duck, Gold Fork, and Willow Creek areas (FWS 1990). Ospreys are most sensitive to disturbance early in the nesting season from mid-April through mid-July. A no disturbance buffer area of 1/4- to 3/4-mile radius around a nest is generally recognized as the area needed to provide effective protection. However, many of the osprey at Lake Cascade have demonstrated their adaptability to certain types of human activity, with several nests located next to roads. Ospreys have shown a high degree of tolerance of high speed highway traffic as long as vehicles move quickly past the nest site.

The peregrine falcon (*Falco peregrinus*), which was de-listed July 1999, has been successfully released several times at a site 11 miles away from the reservoir in Scott Valley, east of the town of Cascade. There have been summer sightings of peregrines in the Duck Creek area where their primary prey base, waterfowl, are abundant. Peregrines are anticipated to nest in the cliffs and ledges along West Mountain where appropriate habitat is available (Reclamation 1991a). Peregrines are especially sensitive to disturbance during nesting and rearing periods that occur between mid-March and the end of July. A 1-mile, year-long, no disturbance radius around nests are considered appropriate to protect this re-

covering species. No peregrines are known to nest in the vicinity of Lake Cascade (Levine et al. 1998).

Amphibians and Reptiles

Amphibians and reptiles typically found in the study area are listed in Table 2.1-9.

The former river meanders of the North Fork, Lake Fork, and Gold Fork arms of the reservoir provide high quality habitat for amphibians. Populations of many frog species have apparently suffered declines on a global scale in recent years, making all suitable habitat especially important.

Mammals

Small mammals that commonly occur in the vicinity of Lake Cascade are listed on Table 2.1-10. Terrestrial small mammals provide an important food supply for area predators. A bat roost (species unidentified) is located under a bridge over one of the reservoir arms. The reservoir arms also provide high quality habitat for furbearers such as beaver (*Castor canadensis*), river otter (*Lutra canadensis*), muskrat (*Ondatra zibethicus*), mink (*Mustela vison*), badger (*Taxidea taxus)*, raccoon (*Procyon lotor*), coyote (*Canis latrans*), striped and spotted skunk (*Mephitis mephitis, Spilogale putorius)*, long-tailed weasel (*Mustela frenata*), and red fox (*Bulpes vulpes*) (listed on Table 2.1-11). Red fox are common throughout the Lake Cascade area.

River otters forage extensively along the northern drainages that flow into the reservoir; the North Fork of the Payette River and Gold Fork, Lake Fork, and Boulder creeks are used most extensively (Melquist and Hornocker 1983). Melquist and Hornocker's study indicated that fish are the most important prey item of otters, occurring in 93 to 100% of fecal samples (FWS 1990). Larger mammals are less common but are present in the area and listed in Table 2.1-11. White-tailed deer (*Odocoileus virginianus*) occur in riparian areas, mostly in the North Fork river bottom, and a few elk (*Cervus elaphus*) may also forage in the reservoir area (Reclamation 1991a). Elk and mule deer (*Odocoileus virginianus*) use the dense timber and wet meadow complexes of West Mountain (immediately west of Lake Cascade) during the spring and summer. During late November, these species migrate west into the Weiser River drainage for the winter. Deer also use the southern end of the reservoir and the Hot Springs WMA as winter habitat, and a few deer and elk may winter in the Crown Point area where there is a good bitterbrush stand.

This area, on the east side of the reservoir, has less snow and is warmer because of its westerly aspect.

The west shoreline is not good winter range because of its colder, east-facing exposure and greater accumulation of snow, although some wintering may occur in mild winters. The Willow Creek area is also a wintering ground

Table 2.1-9. Amphibians and Reptiles Found in the Lake Cascade RMP Area.

Common Name	Scientific Name
Amphibians	
Long-toed salamander	*Ambystoma macrodactylum columbianum*
Western toad	*Bufo Boreas*
Pacific chorus frog	*Hyla regilla*
Spotted frog	*Rana luteiventris*
Reptiles	
Rubber boa	*Charina bottae*
Gopher snake	*Pituophis melanoleuces deserticola*
Common garter snake	*Thamnophis sirtalis*
Western garter snake	*Thamnophis elegans*

Sources: Reclamation 1991a, FWS 1990, and Groves et al. 1997

Table 2.1-10. Small Mammal Species Present in the Lake Cascade RMP Area.

Common Name	Scientific Name
Masked shrew	*Sorex cinereus*
Long-legged brown bat	*Myotis volans*
Montane meadow mouse	*Microtus montanus*
Deer mouse	*Peromyscus maniculatus*
Golden-mantled ground squirrel	*Spermophilus laterlis*
Red squirrel	*Tamiasciurus hudsonicus*
Snowshoe hare	*Lepus americanus*
Yellow-bellied marmot	*Marmota flaviventris*
Mountain cottontail	*Sylvilagus nuttallii*
Yellow pine chipmunk	*Eutamias amoenus*
Porcupine	*Erethizon dorsatum*

Sources: Reclamation 1991a, FWS 1990, and Groves et al. 1997

for a few elk. Occasionally, a small number of elk swim across the reservoir during their annual migration to and from winter ranges in the west. Most elk summering on West Mountain migrate to the west to the Weiser River drainage for the winter. Moose (*Alces alces*) are only occasionally observed passing through the area; there is no resident population (FWS 1990). Mountain lion (*Felis concolor*), bobcat (*Lynx rufus*), and pine marten (*Martes americana*) occur in the mountains to the west of the reservoir but rarely occur in the valley.

Black bears (*Ursus americanus*) are nomadic, with their movements depending largely on berry production of forest shrubs, one of their main sources of food. Black bears generally stay in the forested areas on West Mountain except during dry, poor berry years. The North Fork of the Payette is a travel corridor for bears.

Photo 2-3. Rocky Mountain Elk

Big game hunting on Reclamation lands is not encouraged because of the potential danger to adjacent residents. However, Reclamation has no enforcement authority with regard to hunting except in campground areas. The IDFG has full authority and responsibility and will cooperate with Reclamation if a hazard is shown to exist. Gold Fork and Sugarloaf are the primary hunting areas for waterfowl. Waterfowl hunting is safer in these areas because fewer homes are located along the shore.

Federally Listed Fish and Wildlife Species

Bald Eagle

The FWS recently determined that bald eagles are still a threatened species in Idaho. Like ospreys, the nesting bald eagle population at Lake Cascade has also increased. The first bald eagle nest was discovered in the reservoir area in 1976. There are now eight known active bald eagle nests around the reservoir, with six pairs on the west side and two on the east. Three pairs also nest along the North Fork of the Payette River within a few miles to the south of the reservoir (Beals and Melquist 1998). There are also two bald eagle nests along the Payette River between Lake Cascade and McCall.

The 1990 Cascade Reservoir BEMP provides recommendations on recreation use, timber management, livestock management, eutrophication, areas exempted from eagle manag-

Table 2.1-11. Furbearers and Large Mammals Found in the Lake Cascade RMP Area.

Common Name	Scientific Name
Furbearers	
Beaver	*Castor canadensis*
Voles	*Microtus spp.*
River otter	*Lutra canadensis*
Muskrat	*Ondatra zibethicus*
Mink	*Mustela vison*
Badger	*Taxidea taxus*
Raccoon	*Procyon lotor*
Coyote	*Canis latrans*
Striped skunk	*Mephitis mephitis*
Spotted skunk	*Spilogale putorius*
Long-tailed weasel	*Mustela frenata*
Red fox	*Vulpes vulpes*
Large Mammals	
White-tailed deer	*Odocoileus virginianus*
Elk	*Cervus elaphus*
Moose	*Alces alces*
Mule deer	*Odocoileus hemionus*

Sources: Reclamation 1991a, FWS, 1990, and Groves et al. 1997

ment, chemical use, control of pesticides, and an annual interagency evaluation of wildlife management resources at the reservoir. The majority of those recommendations were incorporated into the 1991 RMP.

Eagle territories include nest sites, perch trees, and foraging areas. Eagles typically nest in isolated, mixed-aged timber in codominant or dominant trees with a clear flight path to feeding areas; in this case, feeding areas include the reservoir. Management for protection requires a 3/4-mile no disturbance radius around the nest throughout the year, but important habitat areas extend throughout the reservoir, especially along the west shoreline outside of developed sites. Human presence interferes with hunting behavior of bald eagles, although the degree to which their behavior is affected varies for individual eagles. There have been many reports of eagles diving for fish near boats. Nesting behavior, however, is more defensive and subject to disturbance.

Fish throughout the reservoir provide the primary prey for the bald eagle. In the spring, ice melts first in the Hot Spring Creek area, exposing live fish to capture. Also, winter-killed fish begin to wash up along the shoreline. As the reservoir thaws and the readily available supply of dead fish is depleted, bald eagles switch to live fish again and to shorebirds and waterfowl. A late summer fish die-off resulting from warm temperatures and oxygen depletion again supplies dead fish for sustenance. Suckers (*Catostomidae*) and bullheads (*Ictalurus* sp.) congregating in shallow bays at this time provide a source of live fish.

The FWS is concerned about the protection of the eagle foraging area that includes the open water area and wetlands of Lake Cascade and all the land west to an elevation of 6,500 feet on West Mountain between Poison Creek and the Van Wyck Trail. Some locations for potential recreation areas are restrained by the bald eagle recovery goals and the proposed terms and conditions for bald eagle protection specified by the FWS for the proposed WestRock Resort.

Canada Lynx

The FWS letter listing species protected under the ESA includes the lynx (*Lynx canadensis*), which was recently listed as a threatened species (see Appendix B). Idaho is near the

southern limits of the lynx range. Mountainous regions supporting stands of spruce (*Picea* sp.) and fir (*Abies* sp.), Douglas-fir, and lodgepole pine are generally considered to be suitable lynx habitat (Ruggiero et al. 1999). Snowshoe hares represent the lynx primary prey (Hall 1981) and red squirrels (*Tamiasciurus hudsonicus*) are an important alternate prey when hares are scarce (Ruggiero et al. 1999). USFS lands immediately west of Lake Cascade and Reclamation lands along the North Fork of the Payette River may provide suitable lynx habitat based on the tree species present and the relatively undisturbed nature of those areas. Snowshoe hares are probably present in both areas, and red squirrels are present on the USFS lands.

The WestRock Resort Wildlife Habitat Conservation Plan (WestRock 2000) states that lynx are not known to be present in their project area and that the nearest recent lynx records are from about 20 miles to the east of Lake Cascade. WestRock (2000), citing an unpublished USFS report, also states that the availability of prey for lynx in the West Mountain area is considered low when compared to other areas of the Cascade Ranger District of the Boise National Forest.

Potential denning habitat is located 6 to 7 miles northeast of Lake Cascade in the Sloan Creek and Kennally Creek watersheds, which are tributaries of the Gold Fork River. In addition, suitable foraging and denning habitats have been identified west of Lake Cascade on the National Forest. USFS has ongoing efforts to determine whether lynx are present and how this species uses habitats in the area. Lynx have been reported, but not confirmed, within the West Mountain lynx analysis units west of Lake Cascade, and a lynx track was documented in December 1999 in the Deadwood drainage southeast of the lake (USDA-Payette National Forest 2000; USDA-Boise National Forest 2000).

Lynx are generally secretive and rarely venture into populated areas. However, hare populations are cyclic on a 10- to 11-year cycle. Lynx may move into lower elevation, more populated areas during periods when low hare numbers drop below 0.5 hares per hectare (Ward and Krebs 1985). This movement could result in lynx occasionally traveling through and foraging on Reclamation lands, but this occurrence would probably be rare.

Gray Wolf

The gray wolf (*Canis lupus*) is classified as an experimental non-essential population throughout most of Idaho, including the Lake Cascade area (59 FR 60266). Wolves may currently occupy the forested areas east and northeast of Lake Cascade. Wolves have been documented in the West Mountain area southwest of Lake Cascade during a tracking survey in the winter of 2000. Recently, several wolf sightings and tracks have been located on both the east and west sides of Lake Cascade. Denning and rendezvous sites have not been located in the Lake Cascade area; however, based on the frequency of observation of wolves, it is possible that wolves may become established in the area west of Lake Cascade if there is sufficient food base available (pers. comm., C. Niemeyer and R. Vizgirdas, USFWS 2000; pers. comm., T. Holden, U.S. Forest Service 2000; USDA-Boise National Forest 2000).

Bull Trout

The FWS letter listing species protected under the ESA includes the bull trout (*Salvelinus confluentus*) as possibly occurring in the RMP Study Area (see Appendix B). A review of IDFG Fisheries Management Plan 1996–2001 (IDFG 1996) and the State of Idaho Bull Trout Conservation Plan (IDFG 1998) indicates that the North Fork of the Payette River drainage is not listed as a key watershed for the bull trout, and surveys have not found them in Lake Cascade (IDFG 1998).

Bull trout are documented within the Lake Cascade watershed; however, they are restricted to the Gold Fork River above the impassable irrigation water diversion dam constructed in the 1930s. Focal (spawning and rearing) habitat supporting a single depressed bull trout population is located in the tributaries of the upper Gold Fork River watershed. No bull trout have been found in the lower reaches of the Gold Fork River below the diversion dam or in Lake Cascade in recent times. In some areas of Idaho, reservoirs and lakes provide important habitat for the species. Conditions in Lake Cascade are likely unsuitable for bull trout because of warm water temperatures and poor water quality (USDA-Payette National Forest 1998; Steed 1998).

Rare and Sensitive Species

The FWS letter concerning rare species in the area listed several wildlife species about which they are interested because their declining population status and/or threats to their long-term viability (see Appendix B). While these species have no legal status under the Endangered Species Act (ESA), their long term viability is also of interest to Reclamation. Therefore, the potential status of each of these species are addressed briefly here.

The fisher (*Martes pennanti*) prefers late-successional conifer forests and especially riparian zones (Powell and Zielinski 1994), but have also been reported to prefer young to medium aged conifer stands in parts of the Rocky Mountains (Jones 1991, Roy 1991). Douglas-fir is mentioned as a preferred habitat type, and snowshoe hares (*Lepus americanus*) are one of their primary prey species. Suitable fisher habitat may occur on USFS lands to the west of Lake Cascade. However, the range of the fisher in Idaho may not include the immediate Lake Cascade area (Groves et al. 1997).

Kelsall (1981) defines wolverine (*Gulo gulo luscus*) habitat as areas with adequate year-round food supplies, in large sparsely inhabited wilderness areas rather than in terms of topography or plant associations. Groves et al. (1997) describes wolverine habitat in Idaho as remote, mountainous areas unaffected by human disturbance, and their range map includes all of Valley County. Wolverines have large home ranges and are known to move long distances in search of food. More remote portions of West Mountain could be frequented by wolverines. The valley and Reclamation lands around Lake Cascade are probably too populated to provide quality wolverine habitat.

The long-eared myotis (*Myotis evotis*) occupies forested lands throughout Idaho, especially near water. Roosts are always located near water. This species is common in lodgepole pine forests (Groves et al. 1997). Suitable habitat may exist along the North Fork of the Payette River arm of Lake Cascade, where lodgepole pine is common and there is abundant water nearby.

Flammulated owl (*Otus flammeolus*) habitat in Idaho consists of older ponderosa pine, Douglas-fir, and mixed conifer forests. According to the range maps shown by Groves et al. (1997), flammulated owls occur throughout much of Valley County and therefore may occur on Reclamation and adjacent forested lands. The IDFG letter commenting on the WestRock project (ISLB 1999) indicates that flammulated owls probably occur in the WestRock project area.

Northern pygmy-owls (*Glaucidium gnoma*) prefer dense forests or open woodlands in the mountains or foothills and forage in open meadows. Much of Valley County is shown as being occupied by pygmy-owls (Groves et al. 1997). Suitable habitat may exist along the North Fork of the Payette River Arm of Lake Cascade and in several of the WMAs that support forest stands.

The black-backed woodpecker (*Picoides arcticus*) occurs in coniferous forests (primarily spruce/fir), especially in windfall and burned areas with standing dead trees (Groves et al.

1997). Their range map appears to include the West Mountain area just to the west of Lake Cascade.

In Idaho, northern goshawks (*Accipiter gentilis*) breed in coniferous and aspen forests and winter in lower elevation riparian and agricultural areas. Nests tend to be located in the tallest trees in dense timber stands. Suitable nesting habitat may exist on West Mountain, and Reclamation lands are probably used for foraging and during migration. The IDFG letter commenting on the WestRock project (ISLB 1999) indicates that northern goshawks probably occur in the WestRock project area.

The upland sandpiper (*Bartramia longicauda*) prefers dry grass prairies in Idaho and is not tied to wet areas or shores (Groves et al. 1997). Three of the four locations shown for this species in Idaho are in Valley County, and one appears to include portions of the upper arms of Lake Cascade.

2.2 Visual Resources

2.2.1 Summary of 1991 Visual Resource Conditions

In 1991, the visual environment at Lake Cascade featured predominantly natural- appearing landscapes that included areas where development was highly evident but seen within an overall naturalistic setting. Overall, scenic resources were considered to be at a high level. Human presence was characterized by roads, recreational facilities, residential development, agricultural, and ranching operations, within a general rural (in most cases) to suburban (where development is concentrated) landscape setting.

The landscape of the western shore of the reservoir appeared relatively undeveloped. This was the case even though a certain amount of development was in place, including a main road and several smaller roads, dozens of private residences, and several recreational developments. Because of the extensive forest cover that extends to the shore of the reservoir in many places from the slopes of West Mountain, most development in this area was not particularly evident. This was especially true of the private residential development that was primarily unseen from anywhere but within the developments themselves. The recreation areas were visible to a limited extent from the main road on the west side of the reservoir and from the reservoir itself. Relatively small clearcuts were visible in a few locations.

Photo 2-4. Lake Cascade and West Mountain

On the eastern shore, where the tree cover is less dense and less extensive, higher levels of development were more evident by comparison. As a result, the east side of the reservoir had a visual character that featured more development than the west shore. Within the area, but outside the direct viewshed of the reservoir, the towns of Cascade and Donnelly exist near SH 55. Also, privately owned lands adjacent to Reclamation lands and the reservoir in the areas north of the town of Cascade and south and west of Donnelly were subdivided for residential development. Many individual lot owners constructed boat docks or implemented measures to control erosion of the shoreline in front of their property. This created a general visual disorder that detracted from the natural scenic character of the area, especially when viewed from the reservoir or adjacent properties.

A visually prominent location on the east shore of the reservoir just north of Cascade Dam is known as Crown Point. This area was used in the past by Reclamation and Valley County as a quarry site. Over time, the old quarry has become naturally revegetated with weeds. By 1991, scars from former quarry operations (terraces) were evident only when the site was viewed at close range.

2.2.2 Changes in the Visual Environment Since 1991

From 1991 to 2001, changes in the visual environment have occurred. Some have been the result of Reclamation or other agency actions. Others have resulted from actions by private individuals.

For example, agencies have initiated wetland enhancement and habitat improvement projects in several areas around the reservoir. Several agency projects and numerous private endeavors have also stabilized the shoreline and controlled bank erosion in many areas, but particularly in the northeast portion of the reservoir. Better standards for the design and construction of erosion control features, including retaining walls, have been developed and now apply to permits for construction of these features. This has resulted in a more consistent appearance along the shoreline where more recent structures have been developed.

A number of new residences have also been constructed on private lands near the reservoir. These have occurred mostly on the east side of the reservoir on subdivision lots that were platted prior to 1991. This has resulted in the increasingly suburban appearance in this area.

Vehicular access onto formerly exposed areas of the lake bed during periods of reservoir drawdown has continued. This is particularly true in the Big Sage, Van Wyck, Gold Fork, and Lake Fork areas. This type of use continues to detract from the natural character of the landscape.

The former quarry site at Crown Point has continued to revegetate through natural means and is even less visible and evident than in the past.

2.2.3 Summary Comparison of Changes

While some changes in the visual environment have occurred from 1991 to 2001, most of the changes have been relatively minor. For example, even though a number of new homes have been constructed on previously subdivided lots, the resulting negative change in the overall visual environment has been negligible. In other cases, changes such as wetland enhancements or shoreline stabilization projects have generally produced small but positive visual effects.

2.3 Cultural Resources

The assemblage of sites in the Cascade area reflects the full range of human prehistory and history in the region, from the Paleo-Indian Period through the historic era. Evidence of human occupation in southwestern Idaho dates as early as 10,000 years before present, and archaeological materials dating from the Paleo-Indian to Proto-historic periods have been documented in west-central Idaho. Paleo-Indian Period isolated artifacts in private collections made at Lake Cascade include one Clovis style and a number of Windust Phase projectile points, indicating the reservoir area has been utilized by human groups for more than 10,000 years.

Geographically, Long Valley lies at the edges of the Plateau and Great Basin culture areas. Ethnographically, the Nez Perce of the Plateau area and Shoshoni (especially tukedeka or Sheepeaters) of Great Basin affiliation visited the area and resided nearby. Use of or association with the RMP area primarily centered around traditional subsistence, medicinal, ceremonial, and religious practices. Current Tribal use of and interest in the resources in or near the RMP Study Area, although now more

limited in scope and nature because of the distance from the reservations to Long Valley, continues for the same reasons as in the past.

Documented historical reference to Shoshone-Paiute in the RMP Study Area is meager, but two historical events are remembered by most Tribal members. One, the Sheepeater War of 1878-79, was a series of skirmishes involving soldiers tracking Sheepeater, Weiser, and Bannock people who refused to be relocated to reservation life. The operation lasted three months with the Indians moving throughout the region in and around Long Valley. The other historical event is the account of Chief Eagle Eye, a Weiser leader who also resisted removal to reservation life for years after the Sheepeater War. He succeeded through peaceful avoidance of contact with his white adversaries. When pursued by army troops, Eagle Eye and his small group stayed hidden in Indian Valley (adjacent to Long Valley) where certain of the Weiser people had traditionally maintained winter camps. Some descendants of Eagle Eye reside at Duck Valley today.

Historic and cultural use of Long Valley by the Nez Perce is established in the oral tradition of the Tribe. Hence, the name for the area of Long Valley is /welu.kitpe/. This translates to a "crooked or winding stream," and the name predates the Lewis and Clark expedition by many years. Also, it is known that the general path of the highway from McCall to the city of Cascade follows an ancient trail network utilized by the Nez Perce.

Historically, several Euro-American trappers likely came through Long Valley during the fur trade era, but for the most part, their activities are undocumented. Idaho's early gold mining boom brought some Euro-Americans into Long Valley, although most merely passed through the valley on their way to rich strikes elsewhere. By the mid-1870s, some southern Idaho ranchers began to rely on Long Valley's natural lush hay fields for summer range.

Historic records indicate that Euro-American settlement of Long Valley began in 1883, substantially aided by the appearance of the Oregon Short Line railroad. By 1890, several towns and a sawmill had been established. The arrival of the railroad transformed an economy based on subsistence agriculture into a more diversified commercial economy that supplied both agricultural and lumber products to outside markets. The railroad also serviced several local logging operations and mills. The population in the valley steadily increased until, by 1935, its population stood at about 3,500. In the late 1940s, Reclamation constructed Cascade Dam, as a component of the Bureau's massive network of dams, reservoirs, hydroelectric facilities, and canals contrived to bring irrigation waters to the arid lands of southern Idaho and Oregon.

2.3.1 Prehistoric Resources

Prior to filling, the proposed Lake Cascade reservoir area was surveyed by Phillip Drucker in 1948, as part of the Smithsonian Columbia River Basin Surveys. Since that time, approximately 30 cultural resource survey projects have occurred in the vicinity of the reservoir, most being smaller-scale surveys in response to timber sales, land exchanges, and other land use actions for the Boise and Payette National Forests, Idaho Transportation Department, and Reclamation. One of the more definitive surveys was conducted by Renewable Technologies, Inc. in 1991, under contract from Reclamation, for the purpose of supplementing the 1991 RMP. That survey intensively covered an estimated 8,250 acres above and below the reservoir high water line, and recorded or re-recorded 64 prehistoric or historic sites. In 1999, Reclamation contracted separately with the Nez Perce and the Shoshone-Paiute Tribes for inventories of traditional cultural properties (TCPs) around Lake Cascade.

Thirty-eight prehistoric (aboriginal) sites and 41 prehistoric (aboriginal) isolated finds have been recorded around the Lake Cascade pe-

rimeter. There is reason to believe that the Lake Cascade area contains intact Paleo-Indian sites dating to at least 10,000 years before present (B.P.). A wide variety of temporally diagnostic projectile points (for example, Cascade and Northern Side Notched), as well as other artifacts and stone features recovered in the vicinity of the reservoir also indicate extensive aboriginal use of the study area during the early, middle, and late Archaic periods (8,000 to 1,500 B.P.), extending through the Late Prehistoric Period (1,500 B.P. to 200 B.P.).

All sites except 10VY886 (the Peeled Tree site) are lithic scatters including chipped and sometimes ground stone and, in a few cases, one or more fire-cracked rock features. Chipped stone at these sites is represented by projectile points (including an obsidian Clovis projectile point and other lanceolate points); projectile point fragments; other tools (including knives, scrapers, choppers, saws, picks, and bifacial tool fragments); and obsidian, basalt, chert, and other crypto-crystalline flakes representing various stages of tool manufacture. The sites appear to be short-term or seasonal use locations.

The distribution of prehistoric sites in the RMP Study Area indicates a strong preference by aboriginal peoples for establishing camps on the west side of Long Valley. The majority of prehistoric sites lie on the west side of Lake Cascade between Gibson and Campbell Creeks. Nevertheless, archaeological sites in general (historic and prehistoric) seem to have a widespread distribution around the entire perimeter of the reservoir. The preference for the west side might be attributed to a number of factors, including easier access to sources of good-quality lithic material in the West Mountains, available water year-round (except possibly in the winter), and a cultural preference for a morning view of the sun (the Nez Perce preferred to camp at locations which allowed a view of the sun as it rose in the morning). Of further interest concerning the distribution of recorded sites on the west side of reservoir is the fact that these sites appear to be on slopes averaging 4½%, a possible predictor of archaeological site location in other areas of the reservoir.

Recorded archaeological sites have been impacted or are currently being impacted by several actions, including erosion, recreational development, illegal collection of surface artifacts, and livestock trampling. The role of erosion on the current appearance of sites is undeniably dominant, but the current effects of reservoir wave action are less obvious. With the possible exception of Site10VY797 on the east side of Lake Cascade, none of the known (recorded) sites at Lake Cascade are located in areas of substantial shoreline erosion. While erosion is relatively minor, occasional concentrations of artifacts in the reservoir cutbank or immediately below it suggest some active backcutting.

Upon further testing, many of the Lake Cascade sites could yield important archaeological data and might, therefore, be eligible for the National Register of Historic Places (NRHP). The presence of lanceolate, stemmed, Cascade, and/or Windust projectile points at some sites suggests that the sites have the potential to address questions about the earliest occupants of Long Valley. Lake Cascade sites of the Archaic period might provide information on the transition from dependence on large game to increased reliance on anadromous fish and vegetal foods. Several Lake Cascade sites contain ground stone, suggesting that the development of vegetal food procurement and processing in the region might be reflected in the Cascade materials. Future archaeological testing of key sites is needed to shed more light on the National Register potential of the Lake Cascade sites.

2.3.2 Historic Resources

Sixty one (61) historic resources have been identified in the study area. Four of these sites contain both historic and prehistoric compo-

nents. Historic site types are dominated by structures and features related to logging and agriculture (including grazing). The study area contains a number of farmsteads, most of which have lost their architectural integrity. Other historic site types identified in the study area include refuse dumps of indeterminate importance; transportation sites including a railroad grade, two bridges, and a culvert; various log structures; a damtender's house, school, and sawmill; and a dam.

Historic resources considered eligible for listing on the NRHP include the deck plate-girder bridge (10VY795) over the North Fork of the Payette River immediately east of Cascade Dam, and portions of the railroad grade (10VY800) associated with the Union Pacific Railroad's "Idaho Northern Branch." Both properties are judged significant for their association with early development of the Cascade area and on the basis of aspects of their design and construction.

2.3.3 Traditional Cultural Properties

A survey to identify traditional cultural properties (TCPs) was conducted under separate contracts to the Nez Perce and the Shoshone-Paiute Tribes. For reasons of sensitivity, exact locations are not revealed. TCPs in the Cascade RMP Study Area include locations on the west side of the reservoir where plant resources were harvested for food sources (for example, wild carrots, chokecherries, bearberries, and white sage) and for medicinal sources (for example, western larch and quaking aspen). Dozens of other plant resources were utilized by the Tribes in the RMP area. Nez Perce place names indicate traditional use of the RMP area and adjacent areas for utilization of plant and animal resources. Both the Shoshone-Paiute and the Nez Perce Tribes are known to have utilized the inner bark of Ponderosa Pine trees as an occasional food source, and at least one such scarred tree (the peeled tree site—10VY886) is reported to exist in the RMP area.

Other classes of sites that might also qualify as TCPs in the study area are hunting, fishing, and animal source areas (for example, bald eagle locations); water sources (springs and headwaters); historical places (for example, battlegrounds, rendezvous sites, sites where ceremonies occurred, and routes traveled by important persons); lookout points (hills or vistas); natural hot springs (for example, the area around Arling Hot Springs); and the confluence of tributaries.

2.4 Sacred Sites

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..."

A survey to identify properties of religious or spiritual importance to the Shoshone-Paiute and the Nez Perce Tribes was undertaken for the RMP Study Area. Because of their sensitive nature, specific site locations are not revealed. The Long Valley area is known to have important sacred meaning to both Tribes. Among the Shoshone-Paiute, there is evidence of sacred sites still being used in the Long Valley area. The importance of the Long Valley area to the Shoshone-Paiute and the Nez Perce Tribes is reflected in the histories, place names, and stories recounted by both Tribes. For example, one of the most prominent figures in Nez Perce history, Chief Red Bear, gained his chieftainship in Long Valley. There he witnessed the arrival of the first white people to the area as well as missionaries.

There are natural and cultural property types in the study area that are considered sacred and religious to the Tribes, which might require special attention by Reclamation in the future administration of the study area. These

properties include altars, vision quest sites, burial sites, and geographic features (river and rock features, and natural ponds and lakes).

2.5 Indian Trust Assets

Indian Trust Assets (ITAs) are legal interests in property held in trust by the United States for Indian tribes or Indian individuals. The Secretary of the Interior, acting as the trustee, holds many assets in trust for Indian Tribes or individuals. Examples of things that may be trust assets are 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 individuals by treaties, statutes, and executive orders. These are sometimes further interpreted through court decisions and regulations.

The Shoshone-Bannock Tribes, a Federally recognized Tribe located at the Fort Hall Reservation in southeastern Idaho, have trust assets both on- and off-reservation. The Fort Bridger Treaty was signed and agreed to by the Bannock and Shoshone headmen on July 3, 1868. The Treaty states in Article 4, that members of the Shoshone-Bannock Tribes "shall have the right to hunt on the unoccupied lands of the United States..."

The Shoshone-Bannock Tribes believe that their right extends to the right to fish. The Fort Bridger Treaty for the Shoshone-Bannock has been interpreted in the case of State of Idaho v. Tinno, an off-reservation fishing case in Idaho. The Idaho Supreme Court used the canon of construction to determine the Shoshone word for "hunt" also included to fish. Under Tinno, the Court affirmed the Tribal Members' right to take fish off-reservation pursuant to the Fort Bridger Treaty (Shoshone-Bannock Tribes 1994).

The Nez Perce Tribe, a Federally recognized Tribe located at the Nez Perce Reservation in northern Idaho entered into three treaties with the United States, (Treaty of 1855, Treaty of 1863 and Treaty of 1868) and one agreement (Agreement of 1893). The Nez Perce Tribe states their rights include the right to hunt, gather and graze livestock on open and unclaimed lands, and the right to fish in all usual and accustomed places (Nez Perce Tribes 1995). According to the 1855 Walla Walla Treaty with the Nez Perce, the ceded lands include the northern portion of Lake Cascade.

Other Federally recognized Tribes—the Shoshone-Paiute Tribes of the Duck Valley Reservation at the Idaho and Nevada border and the Burns Paiute near Burns, Oregon—do not have recognized treaty rights outside their Executive Order Reservations (Department of Interior Regional Solicitor's Office – 1997). These tribes may have cultural and religious interests in the area of the Lake Cascade. These interests of the Tribes may be protected under historic preservation laws and the Native American Graves Protection and Repatriation Act (NAGPRA). See Sections 2.3, Cultural Resources, and 2.4, Sacred Sites, for a discussion of other Tribal interests.

2.6 Socioeconomics

Current population trends, employment, and income, as well as public facilities and utilities for the Cascade area and Valley County, are discussed below.

2.6.1 Demographic Profile

During the 1980s, Valley County's population grew 9.1%, reaching 6,109 in 1990. By the end of 2000, the county's population was estimated to be 7,651. This equates to a population increase of 1,542 people and a growth rate of 25.2% over this 10-year time period. For comparison, the state of Idaho's total population growth rate over this the same time period was an increase of 28.5%, while the

U.S. total population growth rate was 13.1% (U.S. Census Bureau 2000a).

The three largest towns in Valley County are McCall (population 3,065), Cascade (population 1,050), and Donnelly (population 137). The population of these three towns represents approximately 54% of the county's total population. County subdivisions and residential/rural parcels make up the remaining 46% of Valley County's population.

Table 2.6-1 shows the age distribution in both Valley County and Idaho State in 1990 and 1999. For the most part, the population distribution and categorical shifts in Valley County resemble that of the state. The primary difference is that while the population of Valley County's senior citizens (65+) increased 1%, the state's declined by 0.7%. Another noticeable difference between the county and state figures was in the 25-44 age bracket. This segment of the population declined at both the county and state levels, but even more substantially in Valley County (-2.8% compared to -4.1%). The most substantial statewide and county shift during time period was in the 45–64 age group with an increase of 4.4% and 5%, respectively. This was followed by the 25 – 44 age group, which increased by 1.1% in Valley County and 1.7% statewide (U.S. Census Bureau 2000a). These shifts in Valley County and the state are similar to the nation as a whole – most of the Baby Boom population has now reached middle age, and some are nearing their 60s.

2.6.2 Economic Setting

Before the 1970s, the agricultural and timber industries generally supported the local economies of Valley County. Economic growth slowed in the early 1980s, then began to expand in the late 1980s in response to growth and development in the Treasure Valley area (Boise and surrounding region). Unprecedented population growth during the 1990s (both permanent and seasonal) brought about more employment in real estate and construction. At this same time, however, the lumber mill in McCall was permanently closed, resulting in a loss of jobs in the timber industry (IDEQ 1998a).

As of 1996, various government agencies employed the greatest number of employees in the county, followed by wholesale/retail trade and services. In Cascade, most jobs have been related to County government and the wood products industry (i.e., the Boise Cascade lumber mill). Agriculture has been another leading industry in the Cascade area. Recreation and tourism remain steady and continue to have a growing influence on the county's overall economy. The cities of McCall and Cascade depend heavily on the recreation expenditures of seasonal homeowners and tourists. The 1997 estimated median household

Table 2.6-1. Valley County and Idaho State Age Distribution Comparison by Year.

Year	Total Pop.	Ages 0-4	%	Ages 5-17	%	Ages 18-24	%	Ages 25-44	%	Ages 45-64	%	Ages 65+	%
Valley County													
1990	6,109	425	7%	1,269	20.8%	305	5%	2,009	32.9%	1,326	21.7	775	12.7%
1999	7,858	493	6.3%	1,456	18.5%	477	6.1%	2,260	28.8%	2,099	26.7%	1,073	13.7%
Difference	1,749	68	(0.7%)	187	(2.3%)	172	1.1%	251	(4.1%)	773	5%	298	1%
Idaho State													
1990	1,006,734	81,546	8.1%	227,848	22.6%	98,391	9.8%	301,832	30%	176,216	17.5%	120,901	12%
1999	1,251,700	92,835	7.4%	257,629	20.6%	143,975	11.5%	340,915	27.2%	274,317	21.9	142,029	11.3%
Difference	244,966	11,289	(0.7%)	29,781	(2%)	45,584	1.7%	39,083	(2.8))	98,101	4.4%	21,128	(0.7%)

Source: U.S. Census Bureau 2000a
Note: Percentages may not add precisely due to rounding

income of Valley County was $33,587, which was nearly identical to the statewide median household income of $33,612 (U.S. Census 2000b).

In February 2001, the Boise Cascade Corporation announced the permanent closure of the Cascade lumber mill, resulting in the permanent loss of 80 full-time timber-related jobs (McCall-Cascade Times Advocate 2001a). This, along with the previous closure of the McCall mill, will likely force the county to be increasingly reliant on government and recreation-oriented jobs. The large percentage of vacation properties in Valley County generally results in large population fluctuations from season to season. It is estimated that approximately 40% of the county's population are seasonal (McCall 2000). However, probably the greatest variable potentially affecting the county's future demographic profile and economy is the WestRock resort development proposal. By WestRock's estimates, there would be another 2,040 new housing units added to Valley County and 1,470 direct jobs as part of the proposed development at project build out in approximately 10 years (McCall-Times Advocate 2001b).