

AFFECTED ENVIRONMENT

CHAPTER 3: AFFECTED ENVIRONMENT

INTRODUCTION

The “Affected Environment” describes existing conditions for those elements of the natural and cultural environments that would be affected by implementing the actions considered in this environmental assessment. The natural environment components addressed include soils, vegetation, wildlife and wildlife habitat, and species of special concern. The cultural components include historic and archeological resources, as well as cultural landscapes. Visitor use and experience and park operations and management are also addressed.

GENERAL PROJECT SETTING

Curecanti National Recreation Area is located in the Gunnison River basin of southwestern Colorado. The landforms and scenery of the Curecanti area are formed by the underlying geology, which dates back to the Precambrian age (from the earth’s beginning to approximately 540 million years ago). Geologists believe that the modern Gunnison River became established in its current course about 10 to 15 million years ago, just after the last eruptions in the San Juan and West Elk mountains located to the south and north respectively (NPS 2006c). The volcanic activity and resulting landforms dictated the course of the Gunnison River and its eventual carving of Black Canyon through the Gunnison Uplift (a block of the earth’s crust that had been forced upwards during the formation of the Rocky Mountains about 60 million years ago) (NPS 2008a, 2006d).

Black Canyon extends for nearly 50 miles, beginning just below Blue Mesa Dam and continuing to the confluence with the North Fork. The canyon is dramatically steep, formed of gneisses, schists, and granites, as can be seen on the walls enclosing Morrow Point and Crystal Reservoirs and at the downstream end of the national recreation area at East Portal (NPS 2008a). Precambrian-aged granitic and metamorphic rocks, some greater than 1.7 billion years old, form much of the landscape in the eastern portion of the park unit. Sedimentary rocks such as sandstone, limestones, and shales laid down by ancient water bodies are also found in the hills surrounding Blue Mesa Reservoir (NPS 2008a).



East Portal

The climate of the Curecanti region is influenced by the surrounding topography. Extremely cold winters are common, due to cold mountain air settling in the basin. The January record low is -44.86° F. Average low and high temperatures vary from -10° to 30° F in winter and 36° to 80° F in summer. Air in this region is also very dry, and precipitation averages only 11 to 12 inches per year (NPS 2008a). The climate of the area influences vegetation in the park unit, which is described in more detail later in this chapter and generally consists of semi-arid shrublands, but also includes canyon bottom and riparian, upland herbaceous, upland woodland, and canyonside and rim plant communities.

CULTURAL RESOURCES

The NPS defines cultural resources as buildings, structures, objects, sites (archaeological and above ground), districts and landscapes that possess prehistoric or historic significance. Significance is further defined as those buildings, structures, objects, sites, districts, and landscapes that are listed or meet eligibility criteria for listing on the National Register of Historic Places (NPS 1998). In order to be classified, a property must meet at least one, and may meet more than one, of the eligibility criteria shown in table 4.

TABLE 4: NATIONAL REGISTER OF HISTORIC PLACES ELIGIBILITY CRITERIA

Criteria	Description
A	Associated with events that have made a significant contribution to the broad patterns of our history
B	Associated with the lives of persons significant in our past
C	Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value, or that represent a significant and distinguishable entity whose components may lack individual distinction
D	Have yielded, or may be likely to yield, information important in prehistory or history

This EA assesses potential impacts to archeological resources, historic structures and districts, and cultural landscapes within the park unit.

ARCHEOLOGICAL RESOURCES

Currently, the national recreation area has 412 sites listed in the Archeological Sites Management Information System, which is the NPS database for the basic registration and management of park prehistoric and historic archeological resources (NPS 2009a). The national recreation area's archeological record indicates intermittent human use of the area from 8,000 B.C. (Paleo-Indian Era), ranging from hunters and gatherers to settlements of agriculturalists, until the Historic Period (NPS 2009b).

To identify areas of potential sensitive archeological and historic resources, a pedestrian survey of routes considered for opening under all alternatives was conducted by professional archeologists in June and July, 2009 (Berger 2009). Approximately 95 miles of possible open routes were surveyed. This inventory resulted in recording 22 new sites to add to the Curecanti National Recreation Area database, for a total of 434 known sites.

Sites consist primarily of prehistoric hunting and gathering camps, open camps, rockshelters, lithic (stone tool) scatters, railroad related features, and farmsteads. Table 5 contains the Curecanti National Recreation Area prehistoric cultural traditions and timeline.

Evidence of the 10,000-year human history of the recreation area is still being revealed and these cultural resources have the potential to be impacted by vehicle use, especially in areas below the high water line at Blue Mesa Reservoir.

One National Register Archaeological District, the Curecanti Archeological District (Record Number 177596), is located within national recreation area and includes numerous Native American sites dating between 10,000 B.C. and A.D. 1888. The District was established in 1984 (NPS 2009d).

TABLE 5: PREHISTORIC CULTURAL TIMELINE IN CURECANTI NATIONAL RECREATION AREA

Cultural Era	Cultural Tradition	Dates	Characteristics
Paleo-Indian	Clovis	11,500–10,500 B.C.	Hunting of now-extinct megafauna subsidized by plant gathering and small game hunting; isolated projectile points and tools.
	Goshen	11,000–10,700 B.C.	
	Folsom	10,800–9500 B.C.	
	Foothills-Mountain	9500–6400 B.C.	
Archaic	Pioneer	6400–4500 B.C.	Exploitation of small game animals and an increased reliance on the gathering of wild plants.
	Settlement	4500–2500 B.C.	
	Transitional	2500–1000 B.C.	
	Terminal	1000–400 B.C.	
Formative	Ancestral Puebloan	A.D. 900–1100	Adaption to agriculture; many of the indigenous people in the region continued to maintain a semi-nomadic lifestyle relying on seasonal hunting and gathering.
	Fremont	A.D. 200–1500	
	Gateway	400 B.C.–A.D. 1300	
	Aspen	A.D. 1–1300	
Protohistoric	Antero	A.D. 1100–1650	Period of transition from aboriginal occupation between the end of the horticultural-based subsistence practices of the Formative Era to the expulsion of the Ute tribes to the reservations in the early 1880s; emergence of highly mobile hunter-gatherer parties and the development of an equestrian lifestyle after contact and trade with Euro-Americans.
	Canalla	A.D. 1650–1881	

Source: Reed and Metcalf 1999

In addition to the Curecanti Archaeological District, the Old Spanish Trail crosses a portion of the Curecanti National Recreation Area. The Old Spanish Trail was designated as a National Historic Trail, a component of the National Trails System, by Public Law 107- 325, on December 4, 2002. The trail was a trading and traveling route that connected Santa Fe with Los Angeles, and was used between 1829 and approximately 1847. The northern route passed through what is now the eastern end of Curecanti National Recreation Area (NPS 2008a).

HISTORIC STRUCTURES AND DISTRICTS

The history of the Gunnison Valley is tied closely to the history of western Colorado. The first documented expeditions in Colorado by non-Native Americans were by Spanish and French explorers and fur trappers. Then in 1849, Captain John W. Gunnison explored a possible rail route to California that ran along the Gunnison River. The expeditions to Colorado's mountains continued until 1859 when the gold rush started and the nature and purpose of explorations in the high country radically changed (Mehls 1984).

The first settlements related to gold mining were prospectors' camps centered on claims. Towns that held out for the long term had ore processing that was at least somewhat accessible, and eventually the railroad stopped there (Mehls 1984). Ranching activities along the Gunnison River began in the 1870s. As the

mining boom declined, ranching took on greater significance in the history of the town of Cimarron near the present-day national recreation area. Both sheep and cattle were run in the open lands of the Cimarron valley and surrounding hills.

The Denver and Rio Grande Railroad (D&RG), later renamed the Denver and Rio Grande Western Railroad (D&RGW), was the most successful narrow gauge railroad to traverse the Rocky Mountains. The railroad linked the cities of Denver, Colorado Springs, Pueblo, and Salida. The main line ran from Salida over Marshall Pass to Gunnison, through the Black Canyon of the Gunnison to Cimarron, and over Cerro Summit to Montrose, before continuing on to Grand Junction and Utah. From the Gunnison area, branch lines ran to Lake City and mining areas at Crested Butte. The D&RGW was constructed in 1881–1882 and operated through Black Canyon of the Gunnison and above Cimarron for nearly 70 years until being abandoned in 1949.

The town of Gunnison served as a rail stop for supplying nearby mining towns such as Crested Butte and for the ranching communities in the Gunnison valley. Evidence of mining, ranching, and logging during the late 19th century, which coincides with construction associated with the D&RGW Railroad, exists at the national recreation area.

The Narrow Gauge Pratt Truss Bridge of the earlier D&RG Railroad northeast of the historic town of Cimarron was listed on the National Register of Historic Places in 1976 as the last remaining structure representing the narrow gauge railroad. The Truss Bridge meets National Register criterion A for broad patterns of history and criterion C for engineering. The truss or steel deck span bridge was installed in 1891. The area of significance is transportation and the period of significance is 19th century. The bridge is noteworthy because of its particular construction and workmanship and because it also represents one of the last remnants of an engineering and construction feat of outstanding ingenuity and tenacity of men trying to invade the mighty maze of the Rocky Mountains to seek the riches these mountains held (NPS 2009d).

In addition to the above listed resources, the NPS lists eight additional features in the fiscal year (FY) 2009 List of Classified Structures (LCS) for Curecanti National Recreation Area near the town of Cimarron (NPS 2009c). All of the features on the LCS are listed in the National Register of Historic Places (as of 2009) or assessed as eligible either under criterion A for broad patterns of history, or criterion C for engineering, or both. Cimarron is home to a display of historic railroad cars that includes Locomotive No. 278, its coal tender, a boxcar, and caboose, which resides on the D&RG truss (also known as trestle) in the Cimarron River Canyon near the town of Cimarron. Built by Baldwin Locomotive Works in Philadelphia in 1882, Locomotive No. 278 served as a mainline freight and helper engine on the Crested Butte Branch and this section of the D&RG main line for over 70 years. The LCS structures are listed in table 6.

TABLE 6: CURECANTI NATIONAL RECREATION AREA LIST OF CLASSIFIED STRUCTURES

Structure Name	Primary Historic Use	Remarks
D&RG Maintenance of Way Box Outfit Car #04414	Rolling Stock	D&RG Maintenance of Way Box Outfit Car 04144 is listed in the National Register under criterion C for engineering. It is representative of the style and method of construction for such cars by the D&RG. The period of significance of this car dates from its rebuilding as a MOW car in 1914.
D&RG Caboose #0577	Rolling Stock	Caboose #0577 is listed in the National Register under criterion A for freight operations on the D&RGW and criterion C for engineering. The period of significance under criterion A is 1886 to 1952. The period of significance under criterion C is 1886.
D&RG Locomotive #278 and Tender	Locomotive	D&RG Locomotive #278 with tender is listed in the National Register under criterion A for its association with Colorado narrow gauge railroad operations, criterion C for the type and method of construction of Baldwin engines used by the D&RG. Period of significance for criterion A is 1882 to 1953 and criterion C is 1882.
D&RGW Boxcar #3132	Rolling Stock	D&RGW Box Car 3132 is listed in the National Register under criterion A for the railroad's role in developing the oil and gas fields in Colorado and New Mexico, criterion C for methods of construction used in building narrow gauge cars. Period of significance under criterion A is 1925 to 1957 and criterion C is 1925.
D&RGW Single Deck Stock Car #5620	Rolling Stock	D&RGW Single Deck Stock Car #5620 is listed in the National Register under criterion A for the D&RGW's role in the development of the Colorado livestock industry, and criterion C as representative of the style and method of construction of D&RGW narrow gauge cars. Period of significance for criterion A is 1926 to 1957 & criterion C is 1926.
D&RGW Double Deck Stock Car #5679D	Rolling Stock	D&RGW Double Deck Stock Car #5679D is listed in the National Register under criterion A for the D&RG's role in the development of the Colorado livestock industry, and criterion C as representative of the style & method of construction of D&RGW narrow gauge cars. Period of significance for criterion A is 1926 to 1957 and criterion C is 1926.
Maintenance of Way Derrick Car	Rolling Stock	The MOW Derrick Car is eligible for listing in the National Register under criterion C for engineering as being representative of a style and method of construction of small track MOW and engineering equipment used by the D&RGW. Period of significance under criterion C is the built date of 1946 (National Register nomination in progress).
Narrow Gauge Pratt Truss Bridge of D&RG	Railroad Bridge	The D&RG Narrow Gauge Pratt Truss Bridge is listed in the National Register as a structure under criterion A for broad patterns of history and criterion C for engineering. The area of significance is transportation and the period of significance is 19th century.

Source: NPS 2009b

CULTURAL LANDSCAPES

Cultural landscapes, as defined by The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes, consist of "a geographic area (including both cultural and natural resources and the wildlife or domestic animals therein) associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values" (NPS 1995a). As part of its ongoing efforts to identify and properly manage its significant cultural resources, the NPS has

tentatively identified the four following cultural landscapes at Curecanti National Recreation Area: Cooper Ranch, D&RGW Railroad, East Portal, and Enbom Sawmill. Only the Enbom Sawmill still has standing structures. To date, the national recreation area has not conducted a formal Cultural Landscape Inventory and is not scheduled for a cultural landscape assessment until after 2012 (Frost 2009).

VISITOR USE AND EXPERIENCE

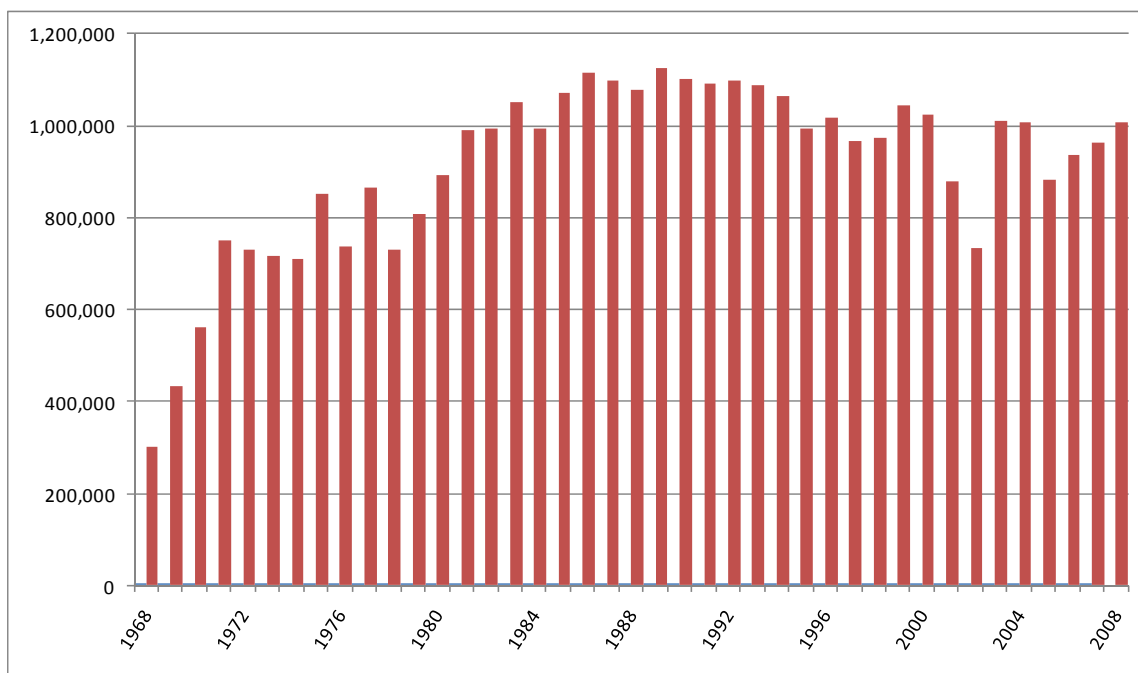
VISITATION

On average, Curecanti has nearly one million visitors annually. According to ranger observation, most visitors to the national recreation area are from Colorado (NPS 2008a), with area summer residents and second home owners also visiting the national recreation area on a regular basis. It is believed that higher gas prices, low reservoir levels, wildfire occurrence, and lower fishing success have led to lower visitor rates in some years.

Visitor numbers first reached one million in 1983 and have stayed between 879,000 and 1,125,447 annually. Based on 10-year average over half of annual visitation to Curecanti occurs in the summer in June, July, and August. More than 5,000 people visit the recreation area each day in June, July, and August. The first year the park began recording visitation numbers was in 1968, which had the lowest visitation with 302,600 (NPS 2008a). Table 7 shows visitation data between 1968 and 2008.

According to table 8, the peak month of campers, anglers, and boaters usage was in July 2008. Within the Blue Mesa District there were a total of 52,632 users that included camping and RV users. Within the Morrow Point District there were a total 4,576 campers and RV users. Within all districts there were 39,246 anglers and 26,601 boaters. The water ways are open to boaters as long as the water is accessible (i.e., not frozen). In the winter months when the ice is thick enough, snowmobiles travel on the lake.

TABLE 7: VISITATION AT CURECANTI NATIONAL RECREATION AREA, 1968–2008



Source: NPS 2008c

TABLE 8: 2008 CURECANTI NATIONAL RECREATION AREA RECREATIONAL USAGE BASED ON OVERNIGHT STAYS

	January	February	March	April	May	June	July	August	September	October	November	December
Blue Mesa District												
Tents/RVs at Elk Creek	0	0	40	160	2,468	6,164	8,092	7,340	2,520	644	0	0
Tents/RVs at Lake Fork	0	0	0	0	1,076	2,456	3,044	1,400	268	56	0	0
Tents/RVs at Stevens Creek	0	0	0	0	236	1,776	3,280	2,540	692	268	0	0
Tents/RVs at Dry Gulch	0	0	0	0	312	280	420	424	112	40	0	0
Tents/RVs at Red Creek	0	0	0	0	16	148	84	76	40	40	0	0
Tents/RVs at Ponderosa	0	0	0	0	428	1,360	724	1,412	372	220	0	0
Boat/Backcountry	0	0	0	0	0	0	0	0	0	0	0	0
Group Camper (East Elk Creek)	0	0	0	0	86	380	905	183	50	0	0	0
Group Camper (Red Creek)	0	0	0	0	8	30	225	55	2	0	0	0
Non-Fee Camping	0	0	0	0	0	0	0	0	0	0	0	0
Blue Mesa District Totals	0	0	40	160	4,622	12,564	16,549	13,375	4,054	1,268	0	0
Morrow Point District												
Tents/RVs at Cimarron	0	0	0	0	128	72	520	568	292	16	0	0
Tents/RVs at East Portal	0	0	0	0	296	508	488	932	604	152	0	0
Boat/Backcountry	0	0	0	0	0	0	0	0	0	0	0	0
Morrow Point District Totals	0	0	0	0	424	580	1,008	1,500	896	168	0	0
All Districts												
Total Anglers	1,170	2,160	990	1,530	4,488	6,330	12,474	5,421	2,511	930	774	468
Total Boaters	0	0	0	360	3,318	5,430	11,160	4,215	1,710	390	18	0

Source: NPS 2008c

RECREATION OPPORTUNITIES

The national recreation area is open year round, but more than half of the annual visits occur in June, July, and August. Blue Mesa Reservoir is the largest and highest body of water in Colorado and is home to the largest Kokanee salmon fishery in the United States (NPS 1997a). Crystal Reservoir and dam afford views into the Black Canyon of the Gunnison National Park. Morrow Point Reservoir and dam offer hiking, boating, and fishing opportunities in a less populated area of the park (NPS 1997a).

The national recreation area includes a mix of developed facilities such as marinas, campgrounds, picnic areas, and boat ramps as well as backcountry opportunities to further serve visitors (NPS 2008a). The national recreation area does not charge an entrance fee except at the East Portal where there is a \$15 per vehicle fee in order to access Black Canyon of the Gunnison National Park.

Much of the recreational use at Curecanti National Recreation Area is water-based, such as boating (motorboats, sailboats, canoes, kayaks), swimming, fishing (off-shore, on-water), sailboarding, and personal watercraft (PWC) use. However, other opportunities exist in the unit for hiking; developed and backcountry camping; picnicking; birdwatching; wildlife watching; sightseeing; scenic driving; horseback riding; cultural, historical, archaeological, and educational activities year round; as well as winter recreational opportunities such as snowshoeing, Nordic skiing, ice skating, ice fishing, and snowmobiling (NPS 2008a).



Dillon Pinnacles

Currently, visitor facilities include 10 developed campgrounds with about 390 campsites and 21 backcountry/boat-in campsites, and 19 picnic areas, with most being located adjacent to campgrounds and other developed areas. The recreation area also provides designated hiking trails running along the reservoirs including the Crystal Creek Trail, Mesa Creek Trail, Hermits Rest Trail, Curecanti Creek Trail, Pine Creek Trail, Dillon Pinnacles Trail, and Neversink Trail (NPS 2008a). These hiking trails vary in difficulty levels, all allowing leashed pet access. Guided Morrow Point boat tours allow visitors a unique point of view of the Gunnison River and geologic formations. Privately owned and managed Recreation Resource

Management offers marina facilities, boat rentals, guided fishing tours, boat supply store, gift shop, gas dock and boat repairs on Blue Mesa Reservoir (NPS 2006e).

Four campgrounds, Elk Creek visitor center, and the Dillon Pinnacles and Hermit's Rest overlooks are accessible for those with mobility impairments (NPS 2006e). Segways and motor driven cycles are permitted for those with mobility impairments on public roads (NPS 2009f).

Due to the proximity of Black Canyon of the Gunnison National Park and scenic US-50 running east-west along the recreation area, many visitors that are passing through stop at scenic overlooks at Curecanti National Recreation Area (NPS 2008a).

MOTORIZED VEHICLE ACCESS

Currently, off-road motorized travel occurs below the high water line of Blue Mesa Reservoir, at an elevation of 7,519 feet, as well as designated routes above high water line. Currently, there are approximately 8,239 acres of land below high water for public motorized vehicle access, although 7,280 acres are not traditionally used because of access limitations created by terrain or reservoir levels. Above high water, approximately 61 miles of routes are open to public motorized vehicle access.

Park policy has allowed vehicle travel below the high water level and lake surface level for the purpose of fishing access and boat launching since 1965. Travel below the high water line is permitted at a few unmaintained routes. These routes are accessed most frequently in the spring when shore fishing is popular. Because of the open topography of shoreline areas and access routes, off-road abuse is monitored by observation. If a visitor travels off an established roadway or in areas above the high water line, violation notices can be issued by park rangers. Certain areas have become more popular with local community members and receive regular seasonal use. Motorized vehicle access below high water facilities reduces congestion and prevents overcrowding at the marina parking lots. These lots often reach maximum capacity during the summer. Because of visitors dispersing along the shore, congestion of vehicles and activity is reduced at the marinas.

Seasonal Closures

Winter weather temporarily closes certain areas of Curecanti to vehicle use on average from December 15 through April 15. All developed areas are temporarily closed to vehicular traffic, except the following (NPS 2009f):

- Elk Creek complex
- Iola boat ramp and access road
- Old Stevens picnic area and access road
- Middle Bridge-Dillon trail parking area
- Lake City Bridge pull-off
- Dry Creek picnic area/access road
- North Willow Creek access road
- Pine Creek
- Neversink
- Lake Fork

Motorized Vehicle Access Closures

Areas of the park have been closed to vehicle use for the protection of historical, cultural, archaeological, or sensitive resources. The following areas have been closed to vehicle travel indicated by carsonite markers (NPS 2009f):

- Dry Creek, from boat ramp west along shoreline at the approximate 7500-foot elevation mark
- Two track along north side of the highway from MP 144 to Rainbow Lake Road
- Two track on Sometime Island
- Two track access above high water line from Old Stevens
- Travel from North Willow restroom east to next drainage
- From South Willow west to Iola
- Along shoreline of Dillon Pinnacles where marked (during low water)
- Barricaded access from HWY 149 to south shore
- Barricaded access from Soap Creek road to shore

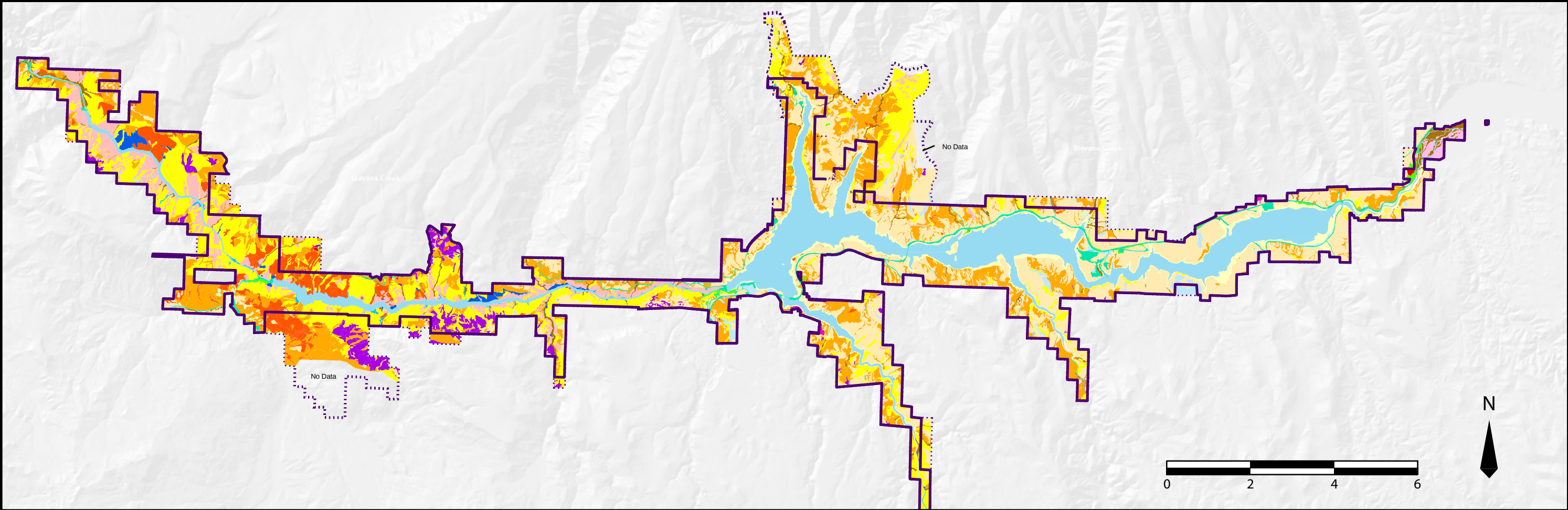


North Willow Restroom

VEGETATION

Although the majority of the Curecanti landscape is best classified as semiarid shrubland (NPS 2008a), vegetation surveys have been conducted to classify and map all of the plant communities found at the park unit, in accordance with the National Vegetation Classification System. Although this classification and mapping is still in draft form (NPS 2009g), these plant communities have been grouped for this planning effort into map units that reflect the diversity of vegetation types found at Curecanti. This includes forests, woodlands, shrublands, riparian areas, grasslands, and sparsely vegetated mixed plant communities. These map units and the corresponding plant communities are described below, and are depicted in map 8.

Map 8. Vegetation at Curecanti National Recreation Area



Vegetation Legend

- | | |
|-------------------------------|--|
| Agriculture | Quarries / Strip Mines and Gravel Pits |
| Aspen Forest | Rabbitbrush Shrubland |
| Bare Rock / Sand | Riparian Vegetation |
| Canyon Shrubland | Rock Spirea Sparsely Vegetated Rock Outcrop |
| Developed | Sagebrush Shrubland |
| Disturbed | Semi-Natural Herbaceous |
| Douglas Fir Woodland / Forest | Shale Barren Mixed Vegetation |
| Gambel Oak Shrubland | Upland Herbaceous |
| Mixed Shrubland | Water |
| Pinyon-Juniper Woodland | Wet Herbaceous |
| | Curecanti NRA Boundary |
| | Proposed NRA Boundary (as indicated in 2008 Resource Protection Study) |

ASPEN FOREST

Vegetation in this map unit primarily consists of forests dominated solely by quaking aspen (*Populus tremuloides*) in the overstory, although it also includes a mixed evergreen-deciduous forest characterized by both quaking aspen and Douglas-fir (*Pseudotsuga menziesii*). The understory of these forests are variable, and some support shrub layers of Saskatoon serviceberry (*Amelanchier alnifolia*), mountain snowberry (*Symphoricarpos oerophilus*), Gambel oak (*Quercus gambelii*), tobacco-brush (*Ceanothus velutinus*), or common juniper (*Juniperus communis*). These forests generally occur at elevations of 7,000 to 10,000 feet, and can be found in a variety of places, from valley bottoms to steep mountain slopes to mesa tops (NatureServe 2009a).

DOUGLAS-FIR WOODLAND/FOREST

Vegetation types in this map unit are dominated by Douglas-fir and generally occur below 10,000 feet on moderately steep to steep slopes, some with north-facing aspects, as well as along drainages. These forests also have other tree species that may be codominant in the canopy, such as pines (*Pinus* spp.), Rocky Mountain juniper (*Juniperus scopulorum*), subalpine fir (*Abies lasiocarpa*), and aspen (NatureServe 2009a).

PINYON PINE-JUNIPER WOODLAND

Vegetation in this map unit consists of woodlands is characterized by an open to moderately closed canopy of pinyon pine (*Pinus edulis*) and juniper (*Juniper* spp.) trees. Although not all the types found at the recreation area have been described, these woodlands generally occur below 9,000 feet on nearly level to steep rocky slopes and ridgetops. They may differ in the particular juniper species found in association with pinyon pine, which can include one-seeded juniper (*Juiperus monosperma*), Utah juniper (*Juniperus osteosperma*), or Rocky Mountain juniper (*Juiperus scopulorum*) (NatureServe 2009a).

PONDEROSA PINE-DOUGLAS-FIR WOODLAND

This map unit consists of relatively sparsely vegetated woodlands, with an open canopy of ponderosa pine (*Pinus ponderosa*) and Douglas-fir. On the northern Colorado Plateau, these dry woodlands are generally found around 9,000 feet on warm, well-drained, and moderately steep sites. Shrubs form a patchy understory dominated by antelope bitterbrush, although others may also be present. Ground cover is sparse, and is dominated by various grasses (NatureServe 2009a).

CANYON WOODLANDS

This map unit consists of woodlands that support box-elder (*Acer negundo*) and Gambel oak in the overstory, as well as red-osier dogwood (*Cornus sericea*) shrublands. Canopy cover in the woodlands, which are found on steep sites between 6,500 and 7,000 feet in elevation, is open to moderately dense (NatureServe 2009a).

SAGEBRUSH SHRUBLAND

This map unit consists of vegetation types dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), or black sagebrush (*Artemisia nova*). The Wyoming big sagebrush types generally occur between 5,000 and 9,000 feet in elevation in a variety of locations from flat to steeply sloped areas. The density of the shrub layer, which also contains species such as shadscale (*Atriplex confertifolia*), antelope bitterbrush (*Purshia tridentata*), prairie sagebrush (*Artemisia frigida*),

and winter-fat (*Krascheninnikovia lanata*), varies depending on the location (e.g., hot dry sites have lower cover than sheltered sites) (NatureServe 2009a).

Shrublands dominated by mountain big sagebrush generally occur in a variety of locations between approximately 5,000 and 10,000 feet elevation, from valley bottoms to slopes of mesas and plateaus, to ridgetops (NatureServe 2009a). Another mountain big sagebrush type, which is found on rock outcrops and also supports rock spirea (*Holodiscus dumosus*), has been identified at the recreation area but has not been described.

The big basin sagebrush type occurs on valley bottoms, stream terraces, and other relatively mesic sites between approximately 6,000 and 7,900 feet (NatureServe 2009a).

Although other shrubs may be present, black sagebrush shrublands are characterized by a relatively sparse to moderately sparse shrub layer dominated by this low-growing (less than about 2 feet) species. These shrublands are generally found on dry sites at elevations of 5,000 to 10,000 feet on shallow rocky soils (NatureServe 2009a).

GAMBEL OAK SHRUBLANDS

Many of the Gambel oak shrublands in Curecanti and generally considered mixed or mosaic plant communities because they support a co-dominant shrub species that also characterizes the particular type. These co-dominant shrubs include basin big sagebrush, alderleaf mountain-mahogany (*Cercocarpus montanus*), Utah serviceberry (*Amelanchier utahensis*), mountain snowberry, and rock spirea. These plant communities occur in a variety of locations between approximately 5,000 and 9,000 feet in elevation, although the Gambel oak/mountain snowberry type is restricted to more mesic sites and the Gambel oak-rock spirea type is limited to rock outcrops and landslide deposits (NatureServe 2009a).

MOUNTAIN MAHOGANY SHALE SHRUBLAND

This map unit includes alderleaf mountain mahogany shrublands, and although not specifically described, such shrublands are generally found below 8,000 feet on xeric and rocky sites with moderate to very steep slopes, or on ridges. On the Colorado Plateau, it other shrubs may be associated with alderleaf mountain mahogany, such as serviceberry (*Amelanchier* spp.), rock spirea, creeping Oregon-grape, and Gambel oak (NatureServe 2009a).

PARRY’S RABBITBRUSH SHRUBLAND

This map unit is characterized by sparse to dense shrublands dominated by Parry’s rabbitbrush (*Ericameria parryi*). It is found on bajadas (broad slope of debris spread along the lower slopes of mountains by descending streams), pediments (any relatively flat surface of bedrock that occurs at the base of a mountain or as a plain having no associated mountain), and valleys, and may include other shrubs (NatureServe 2009a).

ROCK SPIREA SPARSELY VEGETATED ROCK OUTCROP

This vegetation type is found on cliffs, talus deposits below cliffs, boulder fields, and ridgetop outcrops between approximately 7,000 and 10,000 feet in elevation. It is characterized by a sparse to open canopy of rock spirea, with chatter tree saplings. A diversity of other shrubs may be present, but sparse, while grasses and forbs contribute low to moderate cover (NatureServe 2009a).

FRINGED SAGEBRUSH DWARF SHRUBLAND

This plant community, which is often found on exposed wind blown sites between 7,500 and 10,000 feet in elevation, is characterized by the presence of fringed sagebrush and several grasses, including blue grama, Indian ricegrass, and curly bluegrass (NatureServe 2009a).

RIPARIAN VEGETATION

This map unit consists of shrublands dominated by Geyer's willow (*Salix geyeriana*), as well as woodlands characterized by either narrowleaf cottonwood (*Populus angustifolia*) or blue spruce (*Picea pungens*). These vegetation types are all found along streams and rivers, although in varying locations. The Geyer's willow shrublands are found on seasonally saturated or flooded sites (e.g., streambanks, terraces, floodplains) of wide mountain valleys, cirques, and troughs between 5,000 and 9,000 feet. They have an open canopy characterized by clumps of Geyer's willow, although other shrubs may be scattered around the bases of the willows. The understory is diverse, and consists of a mix of mesic grasses and forbs, most commonly a variety of sedges (*Carex* spp.) (NatureServe 2009a).

Two of the narrowleaf cottonwood woodlands at the recreation area are characterized as mixed deciduous and evergreen vegetation because of the presence of blue spruce or Rocky Mountain juniper in the canopy. The narrowleaf cottonwood-blue spruce woodland is found between 6,400 and 9,600 feet on floodplains, active channel margins, and stream. It has an open to moderately dense canopy with a dense and diverse shrub understory characterized by gray alder. The narrowleaf cottonwood-Rocky Mountain juniper woodland is a semi-riparian vegetation type found on high, dry stream terraces between 5,700 and 7,900 feet. It is characterized by a moderately open canopy with very few dry-site shrubs in the understory, such as Gambel oak, sagebrush, creeping Oregon-grape, antelope bitterbrush, Wood's rose and mountain snowberry (NatureServe 2009a).

The other narrowleaf cottonwood woodlands found at the recreation area are characterized by a dominant shrub found in the understory, including Wood's rose, skunkbush sumac (*Rhus trilobata*), chokecherry, red-osier dogwood, or gray alder. Those with Wood's rose, skunkbush sumac, and chokecherry are generally some of the drier narrowleaf cottonwood types, found on rarely to infrequently flooded stream terraces or adjacent floodplains between approximately 5,000 and 8,500 feet in elevation (NatureServe 2009a). The narrowleaf cottonwood woodlands further characterized by red-osier dogwood and gray alder differ from the others, as they are found on actively flooded benches or broad floodplains in foothill and montane environments. These woodlands have open to relatively closed canopies, with dense to moderately dense shrub layers dominated by the characteristic shrubs. This riparian woodland is found in deep shaded canyons and narrow valleys in montane and subalpine areas at elevations of 6,100 to 10,650 feet. They have a somewhat open to moderately dense canopy strongly dominated by blue spruce, and a thick shrub layer of gray alder found in a narrow band along the stream channel. Other shrubs may be present, but contribute much less cover (NatureServe 2009a).

SEMI-NATURAL HERBACEOUS VEGETATION

This map unit includes three plant communities that are primarily characterized by the presence of the non-native species redstem stork's-bill and cheatgrass, as well as the native Candian horseweed (*Conyza canadensis*). The redstem stork's-bill and cheatgrass types are found in areas that have experienced heavy disturbance that has allowed these non-native species to establish themselves. The red-storksbill type is sparse to moderately dense, and includes other invasive weedy species. Remnants of the native community may also be present, including Mormon-tea (*Ephedra viridis*), pale desert-thorn (*Lycium pallidum*), and fourwing-saltbush (*Atriplex canescens*). Cheatgrass dominates the other disturbed community with over 80% to 90% of the total vegetation cover, making it difficult to determine what

natural community was previously present. These grasslands also include a variety of other *Bromus* species (NatureServe 2009a).

The Canadian horseweed type is unique in that it has only been described from reservoir drawdown areas at Curecanti. Ground cover is sparse to moderately dense, low in diversity, and consists of concentric bands of vegetation around the reservoir. Canadian horseweed, a tall forb, occupies the area at and above the ordinary high water line, while white goosefoot (*Chenopodium album*)—a non-native species in Colorado—occupies the area at and below the ordinary high water line to the water's edge. Other commonly associated forbs are present and contribute low to moderate cover include, while only one grass, foxtail barley (*Hordeum jubatum*), occurs and provides low cover (NatureServe 2009a).

WET HERBACEOUS VEGETATION

This map unit consists of two wetland types dominated by Baltic rush (*Juncus balticus*) and reed canarygrass (*Phalaris arundinacea*). Baltic rush wetlands occur as small, dense patches on flat to gently sloping sites near seems and streams. Other wetland species may be present such as sedges (*Carex* spp.), while some stands also support introduced grasses (NatureServe 2009). Reed canarygrass typically forms dense, monoculture wetlands along riparian areas, pond and lake margins, wet meadows, and intermittent drainages. Other species contribute trace amounts of vegetative cover, and can include introduced species in disturbed sites (NatureServe 2009a).

UPLAND HERBACEOUS VEGETATION

This map unit consists of several plant communities characterized by a dominant grass or forb. They include relatively sparse to moderately dense needle-and-thread grasslands generally found between 5,000 and 9,000 feet in elevation. Some of these grasslands are further distinguished by the presence of Indian ricegrass or curly bluegrass, and they can all be found in a variety of locations, from point bars and stream terraces to benches, plateaus, and ridges (NatureServe 2009). Other grasslands in this map unit are dominated by Indian ricegrass or needleleaf sedge, both of which are considered relatively sparse to moderately dense plant communities (NatureServe 2009a).

SHALE SPARSE/BARREN VEGETATION

This map unit includes plant communities typically found on shale substrates, including badland formations with sparse or barren vegetation. This includes dwarf shrublands dominated by Gardner's saltbush (*Atriplex gardneri*), winterfat, shadscale (*Atriplex confertifolia*), or spiny greasebush (*Glossopetalon sinescens* var. *meionandrum*) (NatureServe 2009a).

Also included in this map unit are sparsely vegetated areas dominated by Indian ricegrass with no more than approximately 25% total vegetation cover. This plant community is found between elevations of 7,200 and 7,600 feet, and although as many as 40 grass and shrub species may be present, the only characteristic species is Indian ricegrass (NatureServe 2009a).

INVASIVE SPECIES

According to the *Federal Noxious Weed Act* (PL 93-629), a noxious weed is one that causes diseases or has other adverse effects on man or his environment and therefore is detrimental to the agriculture and commerce of the United States and to public health. Noxious weeds (also referred to as “invasive plant species”) have the potential to seriously impact natural vegetative communities and associated ecosystems in the recreation area. According to the Curecanti 2008–2012 Strategic Plan (NPS 2008g), there are a total of 280 acres in the recreation area that are identified as “gross infested acres,” which refers to the total

number of acres which are infested with an individual invasive species. Each year, the recreation area and Gunnison County develop an annual operating plan (and cooperative agreement) directed at the control and removal of invasive plant species within and adjacent to the recreation area. The plan targets specific areas to be addressed through chemical and physical treatments of noxious weeds. The 2008 noxious weed plan targeted the following priority species for control:

Black henbane	<i>Hyoscyamus niger</i>
Bull thistle	<i>Cirsium vulgare</i>
Canada thistle	<i>Cirsium arvense</i>
Chicory	<i>Cichorium intybus</i>
Chinese clematis	<i>Clematis orientalis</i>
Common burdock	<i>Arctium minus</i>
Common mullein	<i>Verbascum thapsus</i>
Dalmatian toadflax	<i>Linaria dalmatica</i>
Dame's rocket	<i>Hesperis matronalis</i>
Diffuse knapweed	<i>Centaurea diffusa</i>
Downy brome (cheatgrass)	<i>Bromus tectorum</i>
Field bindweed	<i>Convolvulus arvensis</i>
Hoary cress	<i>Cardaria draba</i>
Houndstongue	<i>Cynoglossum officinale</i>
Jointed goatgrass	<i>Aegilops cylindrica</i>
Leafy spurge	<i>Euphorbia esula</i>
Mayweed chamomile	<i>Anthemis cotula</i>
Musk thistle	<i>Carduus nutans</i>
Oxeye daisy	<i>Chrysanthemum leucanthemum</i>
Perennial pepperweed	<i>Lepidium latifolium</i>
Plumeless thistle	<i>Carduus acanthoides</i>
Prostrate knotweed	<i>Polygonum aviculare</i>
Puncturevine	<i>Tribulus terrestris</i>
Purple loosestrife	<i>Lythrum salicaria</i>
Russian knapweed	<i>Centaurea repens</i>
Russian thistle	<i>Salsola iberica</i>
Saltcedar (Tamarisk)	<i>Tamarix ramosissima</i>
Scentless chamomile	<i>Matricaria perforata</i>
Scotch thistle	<i>Onopordum acanthium</i>
Spotted knapweed	<i>Centaurea maculosa</i>
Yellow toadflax	<i>Linaria vulgaris</i>

The annual agreement between the NPS and Gunnison County contains language that facilitates the location and mapping of areas infested with noxious weeds, in addition to providing requirements for application of herbicides, health and safety protection measures, public education opportunities, and requirements for the protection of water quality and wildlife during the treatment of noxious weeds.

WILDLIFE AND WILDLIFE HABITAT

Curecanti National Recreation Area contains an abundance of wildlife. This section focuses on terrestrial species, including mammals, birds, and reptiles and amphibians in the recreation area that could be affected by motorized vehicle access.

MAMMALS

There are over 50 species of mammals found in Curecanti National Recreation Area, including carnivores, ungulates, small mammals, and bats. Carnivorous mammals, such as bobcat (*Lynx rufus*), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), mountain lion (*Puma concolor*), black bear (*Ursus americanus*), red fox (*Vulpes vulpes*), and long-tailed weasel (*Mustela fennata*) are present in the park with varying abundance for each species. In addition to elk (*Cervus canadensis*), ungulates present in Curecanti include bighorn sheep (*Ovis canadensis*), mule deer (*Odocoileus hemionus*), pronghorn (*Antilocapra americana*), and the occasional moose (*Alces alces*) (NPS 2007b).

Elk, or wapiti, is the largest native deer in Colorado and occur in semi-open forests or forest edges adjacent to meadows and alpine tundra. In the Rocky Mountain region, elk typically migrate between high elevation areas in spring and summer to lower, warmer areas in the fall and winter. In the Upper Gunnison Basin region, summer range for elk is widespread and includes Curecanti National Recreation Area and the surrounding area, although elk concentrate in areas located at higher elevations north of the national recreation area. Movement to this range follows the melting snow and usually begins in mid to late May (CDOW 2001; NPS 2008a). The summer range for elk is more expansive than the winter range, and is important for providing high quality forage for growing calves (CDOW 2005a). Movement to the winter range, which usually begins in October and can continue through December, coincides with increasing snow cover and decreasing forage availability (CDOW 2001, 2005a). During winter, the national recreation area provides concentration areas for elk, and approximately 8,000 acres of severe winter range (NPS 2008a). Severe winter range is that part of the overall range where 90% of the individuals are located when the annual snow pack is at its maximum and/or temperatures are at a minimum in the two worst winters out of ten (CDOW 2008a). This habitat is extremely important during unusually harsh winters when survival of elk can be threatened by lack of accessible food supply (NPS 2008a).

Abundant throughout Colorado, mule deer occupy all ecosystems in the state from grasslands to alpine tundra, but reach their greatest densities in shrublands on rough, broken terrain, with abundant browse and cover (NPS 2008a). Approximately 16,000 acres of severe winter range for mule deer occurs in the national recreation area, and they normally spend their winters in the area surrounding Blue Mesa Reservoir, where the snow is not as deep. As the snow begins to melt, the deer move to higher elevations to take advantage of new food sources (NPS 2006f, 2008a).

Suitable habitat (overall range) for bighorn sheep, which include grasslands or shrub-steppe in mountains, foothills, or river canyons with important escape terrain (cliffs, talus slopes, etc.) (NatureServe 2009b) is widespread in the vicinity of Curecanti National Recreation Area, including 14,600 acres within the park unit boundaries (NPS 2008a). Pronghorn habitat consists of grasslands and semi-desert shrublands in areas with topography that supports good visibility. They are most abundant in shortgrass or midgrass prairies and least common in xeric habitats, such as those surrounding Curecanti National Recreation Area. Approximately 260 acres of winter range for pronghorn exists within Curecanti National Recreation Area (NPS 2008a). Both species are seasonal migrants, and move between higher elevation summer range and a lower elevation winter range based on snow cover and availability of forage (NatureServe 2009b).

In 2004, the Northern Colorado Plateau Network released a report describing the major biophysical features of Curecanti National Recreation Area. The report states that prior to impoundment, the area flooded by Blue Mesa Reservoir was one of the major wintering grounds for mule deer, elk, and bighorn sheep. Since impoundment, the seasonal migration of these animals has been limited due to an entire loss of the bottomland and associated forage (NPS 2004a).

Common small mammals in Curecanti National Recreation Area include the deer mouse (*Peromyscus maniculatus*) and chipmunk (*Neotamias* spp.). Other small mammals in the recreation area include Gunnison's prairie dog (*Cynomys gunnisoni*), American beaver (*Castor canadensis*), shrews (*Sorex* spp.), common muskrat (*Ondatra zibethicus*), squirrels (*Spermophilus* and *Tamiasciurus* sp.), mountain cottontail (*Sylvilagus nuttallii*), northern pocket gopher (*Thomomys talpoides*), and yellow-bellied marmot (*Marmota flaviventris*) (NPS 2007b).

The Black Canyon of the Gunnison provides an ideal environment for bats at Curecanti (NPS 2004a). Species of bats known to be present in the recreation area include big brown bat (*Eptesicus fuscus*), big free-tailed bat (*Nyctinomops macrotis*), Brazilian free-tailed bat (*Tadarida brasiliensis*), long-eared myotis (*Myotis evotis*), little brown myotis (*Myotis lucifugus*), long-legged myotis (*Myotis volans*), silver-haired bat (*Lasionycteris noctivagans*), and western small-footed myotis (*Myotis ciliolabrum*) (NPS 2007b). There are eight other species of bats that are most likely present in the park, but unconfirmed as of 2007 (NPS 2007b).

BIRDS

Over 220 bird species, including shorebirds, waterfowl, raptors (birds of prey), and migrants, have been documented in the variety of habitats at Curecanti National Recreation Area, including shorelines, bottomlands, riparian areas, shrublands, grasslands, woodlands, and mesas. More than half of these are migrants that only occur in the recreation area for less than 2 months out of the year (NPS 2004a, 2007b).

Common waterfowl and shorebirds found at Curecanti National Recreation Area include both residents such as the spotted sandpiper (*Actitis macularius*) and mallard (*Anas platyrhynchos*), as well as migrants such as the ring-billed gull (*Larus delawarensis*) and green-winged teal (*Anas crecca*) (NPS 2007b). Suitable nesting habitat for these species tends to occur in inland areas and narrow portions of the reservoir arms where water-based recreation activity is restricted. Although uncommon in the park unit, waterfowl and shorebirds that nest in these areas also include Wilson's snipe (*Gallinago delicata*), and common merganser (*Mergus merganser*) (NPS 2007b; NatureServe 2009b). All of these birds nest on or near the ground, using brush or plant tufts for building nests and concealment (NatureServe 2009b). In addition, great blue herons (*Ardea herodias*) wade along the shoreline in these narrow reservoir arm areas. A heron rookery is located in the Cooper Ranch/Neversink area in the eastern portion of the national recreation area, and this species generally nests high in woodland trees (NatureServe 2009b).

Raptors known to live in the recreation area depend on other birds and mammals for food, and include red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*Buteo swainsoni*), golden eagle (*Aquila chrysaetos*), bald eagle (*Haliaeetus leucocephalus*), American kestrel (*Falco sparverius*), and great horned owl (*Bubo virginianus*) (NPS 2007b). Of these, the red-tailed hawk is the only species considered common in the park unit, and with the exception of the Swainson's hawk, all are considered resident (NPS 2007b). Scavengers like the common raven (*Corvus corax*), which rely heavily on the remains of other animals for food, also occur (NatureServe 2009b). The American kestrel is a cavity-nesting bird, and the remainder of these species nest in trees relatively high above the ground, as well as on cliffs or ledges (NPS 2007b; NatureServe 2009b).

Other common birds that occur in the recreation and nest on or near the ground include the green-tailed towhee (*Pipilo chlorurus*), vesper sparrow (*Pooecetes gramineus*), horned lark (*Eremophila alpestris*), Canada goose (*Branta canadensis*), common nighthawk (*Chordeiles minor*), Virginia's warbler (*Vermivora virginiae*), and dark-eyed junco (Oregon) (*Junco hyemalis oregonus*) (NPS 2007b; CDOW 2009a; NatureServe 2009b). Common birds that nest in shrubs or saplings from a few centimeters to a few meters above the ground include the brewer's sparrow (*Spizella breweri*), yellow warbler (*Dendroica petechia*), sage thrasher (*Oreoscoptes montanus*), dusky flycatcher (*Empidonax oberholseri*), red-winged blackbird (*Agelaius phoeniceus*), and American robin (*Turdus migratorius*) (NatureServe 2009b). Other common birds that nest in the upper parts of the understory or canopy of woodlands include the warbling vireo (*Vireo gilvus*), western tanager (*Piranga ludoviciana*), and ruby-crowned kinglet (*Regulus calendula*). Woodlands also support common cavity-nesting birds such as the violet-green swallow (*Tachycineta thalassina*), mountain bluebird (*Sialia currucoides*), house wren (*Troglodytes aedon*), and northern flicker (*Colaptes auratus*) (NPS 2007b; CDOW 2009a; NatureServe 2009b). There are also some common bird species present in the recreation area that nest in rock crevices in cliffs and canyons such as the white-throated swift (*Aeronautes saxatalis*) and cliff swallow (*Petrochelidon pyrrhonota*) (NPS 2007b; NatureServe 2009b).

REPTILES AND AMPHIBIANS

Reptiles known to occur in the recreation area include common sagebrush lizard (*Sceloporus graciosus*), plateau lizard (*Sceloporus tristichus*), smooth greensnake (*Opheodrys vernalis*), and terrestrial gartersnake (*Thamnophis elegans*). Amphibians known to occur in the recreation area include only the western chorus frog (*Pseudacris triseriata*) and the tiger salamander (*Ambystoma tigrinum*) (NPS 2007b). Although other reptiles and amphibians are probably present, their presence has not been documented. These include the gophersnake (also commonly known as the bullsnake) (*Pituophis catenifer*), tree lizard (*Urosaurus ornatus*), and northern leopard frog (*Rana pipiens*) (NPS 2007b).

SPECIES OF SPECIAL CONCERN

GUNNISON SAGE-GROUSE

The Gunnison sage-grouse (*Centrocercus minimus*), considered a species of special concern by the state of Colorado and the NPS, uses a variety of habitats throughout the year, although all include sagebrush, especially big sagebrush. Sagebrush is used for hiding and cover as well as for food in the winter. From mid-September into November all individuals use upland areas with 20 percent or greater sagebrush cover and some green forbs (NatureServe 2009b). As winter progresses and snow cover expands and gets and deeper, Gunnison sage-grouse will forage in tall sagebrush shrublands in valleys and lower flat areas, and will roost in shorter sagebrush along ridge tops. From mid-March to early June, male Gunnison sage-grouse use breeding sites called leks—generally open areas with good visibility (for predator detection) and acoustics (for transmission of male display sounds)—to perform mating rituals that attract females. Within the national recreation area, the NPS and CDOW currently monitor leks, including a historically-used area near the shoreline at the Stevens Creek campground (NatureServe 2009b; NPS 2008a).

The birds nest in big sagebrush-dominated communities at the park unit from April to July (NPS 2008a). Generally, nest sites also have grass and forbs that provide additional hiding cover. Females and their young remain in these sagebrush uplands as long as cover is adequate and food (succulent forbs and insects) is available. As the chicks mature and vegetation begins to dry out, females will move their broods to wet meadow areas that provide forage through the summer. Preferred wet meadows contain tall grasses for hiding and nearby sagebrush that are used for hiding and foraging (NatureServe 2009b).

ADOBE THISTLE

As described in the Final Resource Protection Study, Adobe thistle (Rocky Mountain thistle (*Cirsium perplexans*)) is found on barren gray shale slopes and adobe hills in open areas and disturbed sites in mixed shrublands and pinyon-juniper woodlands (Spackman and Anderson 2002). This plant, which flowers from late May through early July, is endemic to the Colorado and Gunnison river valleys, and generally occurs at elevations of 5,000 to 8,000 feet. At the recreation area, adobe thistle can be found in the vicinity of the Morrow Point Reservoir (Spackman and Anderson 2002; NPS 2008a).

SOILS

Throughout the park, rock outcroppings are common. Gravelly soils exist in the Gunnison river valley and rocky soils derived from Mancos Formation shale are prevalent on flats (NPS 2008a). Within Curecanti National Recreation Area, soils have been categorized into seven soil associations and soil types are identified by map unit on soil surveys conducted in Gunnison, Saguache, Montrose, and Delta counties. Where available, a brief description of each of the soil types comprising these map units and their respective propensity for erosion on roads and trails is presented in table 9.

TABLE 9: SOIL DESCRIPTIONS

Soil Series	General Characteristics
Parlin	The Parlin series consist of deep, well-drained soils that formed in alluvium from rhyolite or similar rock. These soils are on hills and ridges and have slopes of 2 to 40 percent. Moderate hazard of erosion on roads and trails.
Lucky	The Lucky series consists of moderately deep, well-drained soils that formed in moderately fine to moderately coarse parent materials weathered from gneiss, schist, or hard tuff. Lucky soils are on mountain side slopes and ridges. Slopes range from 2 to 50 percent. Severe hazard of erosion on roads and trails.
Hopkins	The Hopkins series consists of deep, well- to somewhat-excessively-drained soils that formed in material weathered from rhyolite or in colluvium from rhyolite. These soils are on upland hills, ridges, and valley side slopes. Slopes are 2 to more than 30 percent. Moderate hazard of erosion on roads and trails.
Duffson	The Duffson series consists of moderately deep, well-drained soils that formed in residuum from sandstone and shale. Duffson soils are on hills, ridges, and mountainsides and have slopes of 4 to 40 percent. Severe hazard of erosion on roads and trails.
Cheadle	The Cheadle series consists of shallow, well-drained soils that formed in materials derived from hard sandstone or igneous rock. These soils are on bedrock-floored plains, escarpments, hills, and mountains. Slopes are 2 to 70 percent. Severe hazard of erosion on roads and trails.
Absarokee	The Absarokee series consists of moderately deep, well drained soils that formed in residuum or in colluvium derived from argillaceous sandstone and semiconsolidated shale, or in alluvium over bedrock. These soils are on sedimentary plains and hills. Slopes are 0 to 50 percent. Severe hazard of erosion on roads and trails.
Kubler	The Kubler series consists of deep, well-drained soils that formed in alluvium or glacial till derived primarily from rhyolite and rhyolitic tuff. These soils are on moderately sloping to steep mountain sides or old alluvial fans. Severe hazard of erosion on roads and trails.
Fughes	The Fughes series consists of very deep, well-drained soils that formed in alluvium and slope alluvium derived principally from shale, and interbedded sandstone and shale. The Fughes soils are on alluvial fans, terraces, valley sides, draws, and drainageways. Slopes range from 0 to 65 percent. Severe hazard of erosion on roads and trails.
Delson	The Delson series consists of very deep, well drained soils that formed in alluvial material derived from sedimentary rocks and from residuum and colluvium from sandstone and shale. Delson soils are on stony outwash fans, benches, mountain and mesa side slopes. Slopes are 0 to 65 percent.

Soil Series	General Characteristics
	Moderate hazard of erosion on roads and trails.
Youman	Youman soils typically have very dark gray, loam, friable, granular A horizons, reddish brown, light clay B2t horizons having angular to subangular blocky structure, and light reddish brown, heavy clay loam, neutral C horizons. Severe hazard of erosion on roads and trails.
Shule	Shule soils typically have pinkish gray, very friable, loam, platy A2 horizons, mixed A&B horizons, reddish brown, stony clay loam B2t horizons having subangular blocky structure, and hard bedrock at a depth of about 34 inches. Severe hazard of erosion on roads and trails.
Dewville	The Dewville series consists of deep, well drained soils that formed in sediments derived principally from rhyolite or similar rock. These soils are on moderately to steeply sloping upland alluvial fans and valley-filling side slopes. Severe hazard of erosion on roads and trails.
Corpening	The Corpening Series consists of shallow, well drained, moderately permeable soils that formed in residuum and colluvium derived from limestone. Corpening soils are on hillslopes. Slopes are 2 to 30 percent. Severe hazard of erosion on roads and trails.
Falcon	The Falcon series consists of shallow, well to somewhat excessively drained soils that are formed in materials weathered residually from arkose and similar beds overlying hard sandstone, interbedded sandstone and shale, or conglomerate. They are on upland ridges, hills, mountain sideslopes, mesa tops, and benches. Slopes are 0 to 65 percent. Moderate hazard of erosion on roads and trails.
Coberly	The Coberly series consists of moderately deep, well drained soils that formed in residuum derived from sandstone. Coberly soils are on mesa tops, ridges, and benches. Slopes range from 0 to 65 percent. Moderate hazard of erosion on roads and trails.
Kolob	The Kolob series consist of deep, well drained, moderately slowly permeable soils that formed in colluvium, alluvium and residuum from limestone and sandstone. Found on mesas and mountain slopes. Slopes are 2 to 60 percent. Moderate hazard of erosion on roads and trails.
Kezar	Kezar series consists of moderately deep, well drained soils that formed in material weathered from granite. These soils are on upland hills, ridges, or mountain sides and have slopes of 5 to 40 percent. Severe hazard of erosion on roads and trails.
Cathedral	The Cathedral series consists of shallow, well or somewhat excessively drained soils that formed in slope alluvium, colluvium, and residuum from granite or gneiss. Found on mountain slopes, ridges, and hills with slopes of 2 to 100 percent. Severe hazard of erosion on roads and trails.
Beenom	The Beenom series consists of shallow, well-drained soils that formed in residuum from sandstone or in alluvial or colluvial materials over the sandstone. They are on bedrock floored plains, hills, structural benches, and strath terraces. Slopes are 0 to 60 percent. Severe hazard of erosion on roads and trails.
Mergel	The Mergel series consists of deep, well drained soils that formed in alluvium and mixed glacial materials. Mergel soils are on concave mountain side slopes, on hills and ridges and have slopes of 3 to 65 percent. Severe hazard of erosion on roads and trails.
Ruby	The Ruby series consists of deep, well drained soils that formed in material weathered from rhyolite. These soils are on gently sloping to moderately steep mesa tops and ridges. Moderate hazard of erosion on roads and trails.
Irim	The Irim series consists of very deep, poorly-drained soils on nearly level to slightly concave or depressed areas of flood plains and low terraces. These soils formed in alluvial sediments derived from a variety of sources. Slopes are 0 to 6 percent. Slight hazard of erosion on roads and trails.
Gas Creek	The Gas Creek series consists of very deep, poorly- or somewhat-poorly-drained soils that formed in mixed alluvium. These soils are on alluvial fans or concave areas on terraces. Slopes are 0 to 10 percent. Slight hazard of erosion on roads and trails.
Evanston	The Evanston series consists of very deep, well-drained soils that formed in alluvium weathered from quartzite, sandstone and shale. Evanston soils are on alluvial fans, hills, hillslopes, ridges, and terraces of sedimentary plains and uplands. Slopes are 0 to 65 percent. Moderate hazard of erosion on roads and trails.

Soil Series	General Characteristics
Uinta	The Uinta series consists of very deep, well drained, moderately slowly permeable soils that formed in alluvium and colluvium from conglomerate, sandstone, shale and quartzite. Uinta soils are on till plains, glaciated basins and mountain slopes and have slopes of 3 to 60 percent. Severe hazard of erosion on roads and trails.
Tolvar	The Tolvar series consists of very deep well drained soils that formed in slope alluvium derived mainly from granitic rocks and slope alluvium over colluvium derived from granite, gneiss, and mica schist. Tolvar soils are on moderately to steeply sloping mountain slopes, toeslopes, footslopes, and alluvial fans. Slopes are 3 to 70 percent. Severe hazard of erosion on roads and trails.
Work	The Work series consists of very deep, well drained soils that formed in alluvium or colluvium. Work soils are on alluvial fans, stream terraces, relict stream terraces, plains, and hills. Slopes are 0 to 60 percent. Severe hazard of erosion on roads and trails.
Passar	The Passar series consists of deep, well drained soils that formed in alluvium mainly from rhyolitic tuff. These soils are on gently sloping to steep alluvial fans, and mountain sides.

Source: USDA-NRCS 2009a

BIOLOGICAL SOIL CRUSTS

Soil surfaces in arid and semi-arid lands such as those in Curecanti National Recreation Area can be covered by highly specialized communities of organisms referred to as biological soil crusts, or cryptogamic, cryptobiotic, microbiotic, or microphytic soil crusts. These soils contain cyanobacteria, green algae, lichens, mosses, microfungi, and other bacteria and may constitute up to 70 percent of the living cover in some plant communities. In desert climates, biological soil crusts are often primary contributors to soil fertility, stability, and primary productivity due to the nitrogenase activity of soil lichens, cyanobacteria, and moss (Belnap 1996, 2002). Biological soils function as “living mulch,” by retaining soil moisture, discouraging annual weed growth and reducing wind and water erosion. As a result, they are often used as indicators of ecological health (DOI 2001).

PALEONTOLOGICAL RESOURCES

Paleontological resources are the remains and/or traces of prehistoric organisms that are the primary source of evidence about the biological history of our planet. Fossils are buried in sedimentary rock that can only be collected and studied when these rocks are exposed at the Earth’s surface (SDNHM 2006). The paleontology of Curecanti National Recreation Area shows a history of marine, dinosaur, and plant life from the Jurassic and Cretaceous periods, all part of the Mesozoic Era (248–65 million years ago). Along with the adjacent Black Canyon of the Gunnison National Park, Curecanti National Recreation Area is recognized as having exposed rocks that date to over 1.7 billion years in age, making them among the oldest rocks in Western North America (Connors et al. 2001).

The Morrison Formation, formed approximately 157–147 million years ago during the Jurassic Period, is found above the lake level at Blue Mesa Reservoir (NPS 2009e). During the 1990s, fossilized remains of two dinosaurs, the Apatosaurus and the Allosaurus, were discovered in this formation at Curecanti National Recreation Area. As of 2006, this was only the second major dinosaur discovery site in the Morrison Formation between the Cañon City area and the Uncompaghe uplift in Western Colorado (Koch and Zichterman 2006)

The Morrison Formation also contains an abundance of Conchostracans fossils. Also known as clam shrimp, these fossils bear resemblance, but are not related, to bivalve mollusks. There are also several types of trace fossils preserved within the Morrison Formation, including crayfish burrows, termite nests,

root casts, and clam burrows. These trace fossils predominately occur in sandstone layers which suggest that during periods of non-deposition there was an abundance of small life forms (Connors et al. 2001).

The geologic formation directly above the Morrison Formation is the Dakota Sandstone from the Cretaceous period. This period dates to approximately 99–65 million years ago. Within the Dakota Sandstone, wood and plant fossilization was found. The newest layer containing fish fossilization is the Mancos Shale, located directly above Dakota Sandstone, which was also deposited in the Cretaceous period (NPS 2009e).

NATIONAL RECREATION AREA MANAGEMENT AND OPERATIONS

Land ownership and management within Curecanti National Recreation area is a unique and complex situation. The NPS, Reclamation, and USFS all own land within the recreation area and close coordination among these agencies is crucial to ensure that each agency is able to carry out their mission without impeding the operations of the others. In addition, there are agencies that own and manage lands adjacent to Curecanti National Recreation Area that could be affected by this motorized vehicle access plan. As a result, this section describes land ownership within the recreation area, NPS management and operations, as well as the other entities that operate and manage lands within and adjacent to the recreation area.

LAND OWNERSHIP WITHIN THE RECREATION AREA

Because Curecanti has not been officially designated by Congress as a national recreation area, it does not have a legislated boundary. The national recreation area currently consists of 41,790 acres of land and waters. Reclamation owns 40,360 acres, the NPS owns 1,105 acres and the USFS owns 325 acres (NPS 2008a). The recreation area is managed by both Reclamation and the NPS pursuant to Reclamation law, including the *Colorado River Storage Project Act of 1956*, and a 1965 MOA between the Bureau of Reclamation and the NPS. The Bureau of Reclamation manages the operations of dams, reservoirs, power plants, access roads, and other related facilities while the NPS manages the natural and cultural resources, opportunities for visitor recreation and understanding, and associated facilities (NPS 2008a). The USFS lands in the recreation area are managed by the NPS under an agreement with the USFS.

In August 2008, the NPS (with Reclamation as a cooperating agency) released a Resource Protection Study/EIS which recommended that Congress legislatively establish Curecanti as a National Recreation Area with a legislated boundary, which would include approximately 10,040 acres of additional adjacent lands that are currently administered by other federal and state agencies. Although the recommended congressional action would involve the establishment of a legal boundary for the recreation area, there would continue to be the need for coordination among all agencies that hold a management interest within or adjacent to Curecanti.

NATIONAL PARK SERVICE MANAGEMENT AND OPERATIONS

The base operating budget for Curecanti National Recreation Area was \$3,586,600 in FY 2008, and it is estimated that motorized vehicle access management costs approximately \$82,000 per year. There was a total of approximately 40 full-time equivalent employees in FY 2008, including permanent full-time, part-time, and seasonal staff. Volunteer staff are also used to assist with visitor services. Personnel resources are distributed among the Management, Administration, Resource and Visitor Protection, Facility Management, Interpretation, Education and Technology, and Resource Stewardship and Science divisions, which are described below. These divisions and their staff are responsible for management and operation of both Curecanti National Recreation Area and the adjacent Black Canyon of the Gunnison National Park.

Management Division

This division contains the Office of the Superintendent and is responsible for the overall management of the park. There are a total of three employees, including the superintendent, the management assistant, and the safety officer. All are permanent, full-time employees. There are no seasonal or part-time employees in this division. This division is ultimately responsible for the protection of recreation area resources, and ensuring a safe and satisfactory visitor experience. Management staff supervise all employees, define priorities, manage the park's budget, establish long-range and short-range goals, and ensure that there is adequate financial capital to manage the park unit. The division also coordinates activities with adjacent landowners, and with other federal and state government agencies (McConnell 2009).

Administration Division

The administration division, which consists of five full-time employees, is responsible for contracting, budgeting, human resources and other miscellaneous administrative tasks. Staff includes the division chief, a contracting officer, a budget analyst, a human resources assistant, and an administrative assistant (Rudd 2009).

Resource and Visitor Protection Division

The Resource and Visitor Protection Division has a broad range of responsibilities, including public safety; investigations; enforcement of traffic (including ORVs), boating, and invasive mussel regulations; emergency medical services; and search and rescue operations. This division is also responsible for overseeing commercial use operations in the recreation area. Commercial use operations include private entities that provide guided services within the park, such as fishing guides and climbing tours. Currently, there are approximately 18 to 20 permitted operations between Curecanti National Recreation Area and Black Canyon of the Gunnison National Park (Alick 2009).

The Resource and Visitor Protection Division has three permanent, full-time employees, one permanent, less-than full-time employee, and an average of four temporary employees. During a typical year, the division hires four to five seasonal staff with restricted law enforcement authority. Currently, there is one additional position dedicated to enforcement of invasive mussel regulations, which will be continued in 2010 if funding is available. Staff in the Resource and Visitor Protection Division is split between Curecanti National Recreation and Black Canyon National Park, with a District Ranger for each park unit. These staff members work together as necessary during operations such as extensive search efforts (Alick 2009).

Facility Management Division

The Facility Management Division is responsible for providing repair and maintenance services for parks roads, trails, vehicle fleet, and all facilities. Although the division's management is headquartered at Curecanti, its staff serves both the national recreation area and the national park. There are 16 permanent, full-time employees, including electricians, plumbers, water operators, carpenters, heavy equipment operators, and heavy equipment mechanics. In any year, there are also between 5 and 30 seasonal employees, depending on available funding for projects. For instance, if a new trail is being constructed, then a seasonal crew of two to eight employees would be hired for that season. The division also uses anywhere from 6 to 12 seasonal students from organizations such as the Student Conservation Corps, for specific projects (Waggener 2009).

Interpretation, Education, and Technology Division

This division's responsibilities can be grouped into three categories: interpretation, education, and technology. Interpretation services include management of the parks' visitor centers, ranger-led tours (including ranger-led boat tours and hikes), and informal contacts. Education services include outreach programs for local schools and a "Junior Ranger Program" during the summer months. Technology pertains to the management of the park's web page, podcasts, and other electronic mass media as well as the computer and phone systems for both parks (Snell-Dobert 2009).

The Interpretation, Education and Technology Division at Curecanti has six permanent employees: two supervisory park rangers, a visual information specialist, an education specialist, a visitor use assistant and an information technology specialist. Four of these positions serve both Curecanti and Black Canyon of the Gunnison National Park. The division also takes on approximately 10–15 seasonal park rangers every year. These seasonal rangers work predominantly in the areas of education and interpretation, and not in technology. Occasionally, unpaid college interns are "hired." These students are usually assigned to work in the education branch. The Interpretation, Education, and Technology Division is also responsible for public affairs for the park, issuing press releases and managing media contacts and related activities and events (Snell-Dobert 2009).

Resource Stewardship and Science Division

The Resource Stewardship and Science Division is directly responsible for the management of the park's cultural and natural resources. This involves restoration, control of exotic or invasive species, or research on sensitive species, typically focused in areas of human disturbance. The division has a total of six permanent employees, including an ecologist, a wildlife biologist, an aquatic ecologist, a hydrologist, an archaeologist, and a division chief. Every year, between 10 and 15 seasonal employees are hired to work with one of the permanent staff. The seasonal term is May through September in a typical year, although sometimes the term can start earlier. In addition to its paid staff, this division takes on at least three and at most seven volunteers, unpaid interns, or Student Conservation Association workers, who work for the summer term (Stahlnecker 2009).

OTHER AGENCIES

Bureau of Reclamation

The Bureau of Reclamation is charged with managing, developing, and protecting water and related resources in an environmentally and economically sound manner in the interest of the public. To accomplish that mission, Reclamation must have administrative jurisdiction of its lands, land interests, water and water interests, and facilities necessary to fulfill and protect the authorized purposes of its respective projects. The majority of the lands currently within the recreation area were acquired for the purpose of supporting the Uncompahgre Project and the Aspinall Unit of the Colorado River Storage Project. These projects supply agricultural irrigation water to users in the Uncompahgre River Valley and provide storage of water for beneficial consumptive use by the states of Colorado, Wyoming, New Mexico, and Utah. Facilities associated with these projects include the three reservoirs and dam systems in the recreation area, access roads to each of the dams, and power generation and transmission facilities serving these dams (NPS 2008a). To support their mission goals, Reclamation requires continued access to its facilities located within the national recreation area.

Western Area Power Administration

As a power marketing administration within the U.S. Department of Energy, Western is tasked with the safe and reliable delivery of electric power generated by Reclamation power plants at Aspinall Unit dams. Although they do not own any land within the recreation area, some of Western's power facilities, including transmission lines, substations, switch yards, communication sites, and access roads to these facilities, are located on lands managed by the NPS. Western requires continuous and uninterrupted access to facilities in order to properly conduct operation and maintenance activities. Access needs to most of Western's facilities can often be served by a vegetated roadbed or two-track trail, but in some instances, Western may need to reconstruct or reestablish the old trails or roads, and may need to build new access to allow for the transportation of equipment and personnel to maintain, operate, or reconstruct its facilities (Webber 2008).

U.S. Forest Service and Bureau of Land Management

Although the USFS owns only a small amount of land currently within the recreation area, they own and manage a substantial amount of acreage just to the north of Curecanti. The 1983 Grand Mesa, Uncompahgre, and Gunnison National Forest Land Management Plan, as amended in 1991 and 1993, is the existing land management plan that provides management direction and guidelines for resource management and land use on National Forest System lands in the region (USFS/BLM 2009). The BLM also manages land adjacent to the national recreation area. All BLM lands are managed according to actions outlined in specific resource management plans individually developed for each field office. BLM lands north and south of Blue Mesa and Morrow Point Reservoirs are managed by the Gunnison Field Office. BLM lands from the southern point of Crystal Reservoir to the west within the proposed lands are managed by the Uncompahgre Field Office (NPS 2008a).

In February 2009, the USFS and BLM released a joint DEIS for travel management on their lands in the Gunnison Basin. The Proposed Action and the action alternatives all consider reducing the number of miles of road open to the public for motorized travel in an effort to prevent additional resource damage, minimize user conflicts, and eliminate redundant travel routes (USFS/BLM 2009).

Colorado Department of Transportation / Federal Highway Administration

The CDOT holds easements and rights-of-way for the highways that pass through the recreation area. In coordination with the Federal Highway Administration (FHWA), CDOT is responsible for maintenance, construction and safety activities, and traveler enhancements that occur on the routes they administer (NPS 2008a). Coordination between CDOT and the NPS prior to and during construction or maintenance is important in minimizing any potential impacts to park visitors or drivers passing through the recreation area.

Colorado Division of Wildlife

Three state wildlife areas are adjacent to the national recreation area and are currently managed for wildlife conservation purposes. They include the Gunnison State Wildlife Area (SWA), the Centennial SWA, and the Sapinero SWA, all located to the north of Blue Mesa Reservoir. National recreation area facilities operated under agreement between the Colorado Division of Wildlife (CDOW) and NPS occur on CDOW land within Sapinero SWA, at Dry Gulch campground, and near the East Elk Creek group camp site (NPS 2008a).