Chapter 3: Affected Environment

This chapter of the Environmental Assessment (EA) describes the existing environment that would potentially be affected by the proposed Steinaker Reservoir Resource Management Plan (RMP) alternatives. The resource information presented in this chapter is of sufficient detail to support and clarify the impact analyses provided in Chapter 4 of this document. The resources discussed in this chapter were identified by the public and various groups and agencies that have an interest in the Steinaker Reservoir RMP Study Area (Study Area). Chapter 1 of this document provides a detailed description of the scoping process and outcomes. The resource conditions described in this chapter existed in 2011 and 2012; these conditions established the baseline for analysis of effects in Chapter 4. Resource conditions were determined by onsite inspections, literature searches, and through coordination with local, state, and federal agency personnel.

Local Setting

The Study Area is located between the southern slopes of the Uinta Mountains and the Ashley Valley. Steinaker Dam is located approximately 2 miles north of the Vernal city limits. Additional characteristics of the local setting and project history are described in Chapter 1; this section provides an overview of the existing economic, population, housing, and tourism characteristics of Uintah County.

Economy

Uintah County's economy is characterized by development of oil and gas resources and mining; consequently, international market prices for these natural resources have a strong influence on fluctuations in the local economy. Table 3-1 summarizes employment by industry for Uintah County in the first quarter of 2011. The mining, oil, and gas sector had the largest number of establishments in the county (197) accounted for the largest average employment (2,933 jobs), and had the largest payroll (more than $56 million). Total private sector employment was 10,760 and the total private sector payroll was $126.8 million. The public sector accounted for an additional 2,872 jobs and $24.3 million in payroll.

Growth in oil and gas production in recent years has helped to support growth in the construction, manufacturing, trade, and service sectors, particularly in the Vernal area. As shown in Figure 3-1, employment in Uintah County grew steadily from 2001 to 2008 with average annual employment increasing from 9,866 jobs to 15,273 jobs. Employment has declined somewhat since, with a relatively quick decline to 13,321 jobs in 2009 and a slower rate of decline for the subsequent 2 years. Average employment during the first quarter of 2011 was 12,933 jobs.

Population

Changes in rates of population growth and decline in Uintah County are also closely tied to oil, gas, and mining development trends. Figure 3-2 illustrates population by year from 1940 to 2009. The County's population grew somewhat gradually from 1940 to 1970, with an average

Table 3-1. Uintah County Employment and Income by Sector, First Quarter 2011.

INDUSTRY SECTOR	ESTABLISHMENTS	AVERAGE EMPLOYMENT	PAYROLL	AVERAGE MONTHLY WAGE
Private Sector				
Agriculture, Forestry, Fishing and Hunting	12	50	$311,871	$2,079
Mining (including oil and gas)	197	2,993	$56,243,820	$6,264
Utilities	6	143	$3,034,701	$7,074
Construction	137	769	$8,522,702	$3,694
Manufacturing	32	180	$1,366,712	$2,531
Wholesale Trade	69	618	$9,639,194	$5,199
Retail Trade	123	1,452	$9,386,118	$2,155
Transportation and Warehousing	116	850	$11,095,144	$4,351
Information	13	133	$1,055,381	$2,645
Finance and Insurance	41	185	$1,693,210	$3,051
Real Estate and Rental and Leasing	77	402	$5,809,084	$4,817
Professional Scientific and Technical Services	92	393	$3,651,186	$3,097
Admin., Support, Waste Management Remediation	41	296	$2,600,631	$2,929
Education Services	8	21	$65,145	$1,034
Health Care and Social Assistance	63	965	$6,638,583	$2,293
Arts, Entertainment, and Recreation	11	23	$37,344	$541
Accommodation and Food Services	65	952	$2,802,980	$981
Other Services (except Public Administration)	79	378	$3,112,934	$2,745
Total Private Sector	**1,172**	**10,760**	**$126,837,234**	**$3,929**
Public Sector				
Federal Government	27	370	$5,272,640	$4,750
State Government	16	157	$1,526,337	$3,241
Local Government	60	2,345	$17,500,320	$2,488
Total Public Sector	**103**	**2,872**	**$24,299,297**	**$2,820**

Source: UDWS (2012).

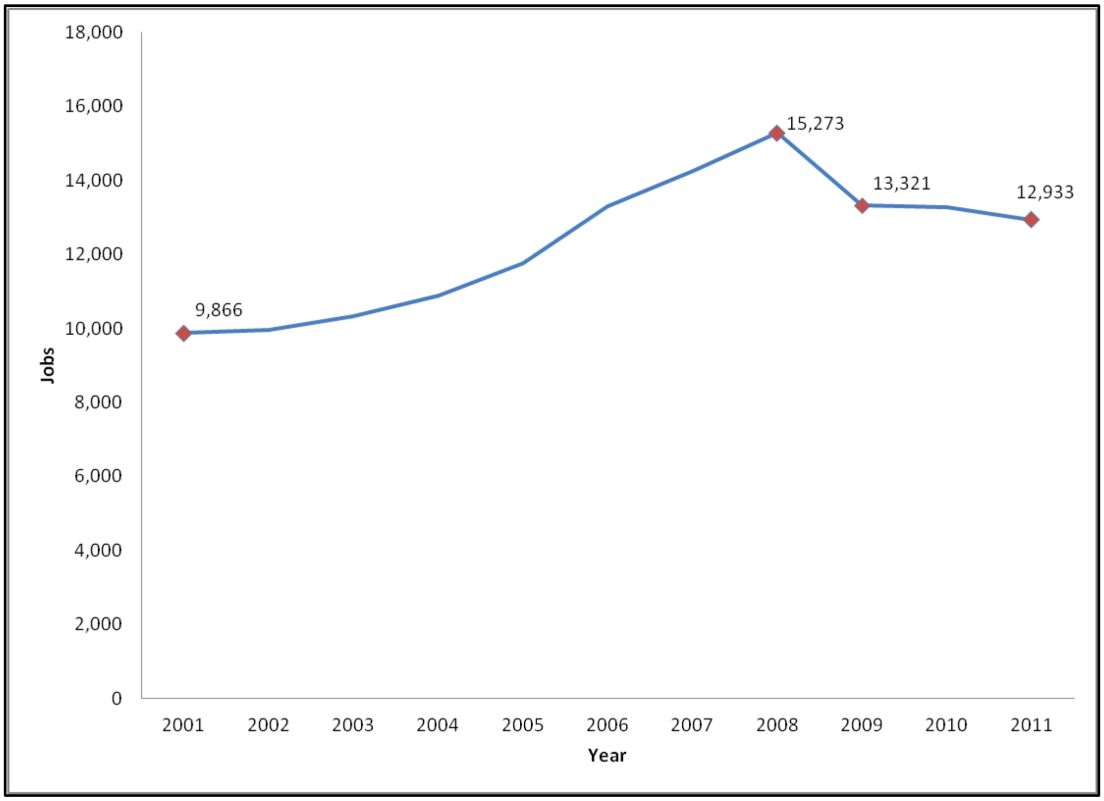

Figure 3-1. **Uintah County Average Employment, 2001–2011 (UDWS 2012).**

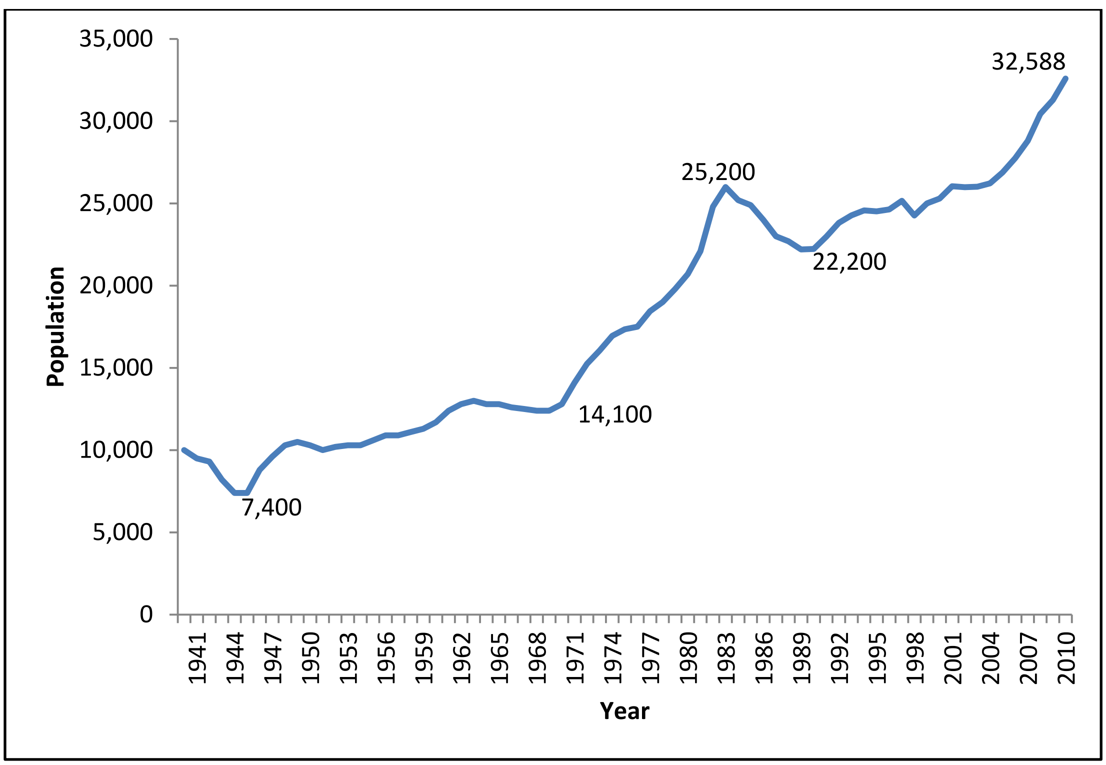

Figure 3-2. **Uintah County Population 1940–2010 (GOPB 2012, U.S. Census Bureau 2012).**

annual growth rate of about 1 percent during this period. There was significant out-migration in most years during this period, with growth largely due to natural increase. In 1970 the population of Uintah County was 12,800. Beginning in that year, the rate of growth increased significantly, averaging about 5 percent annually until 1982 when the population peaked at 26,000. However, collapse of the oil shale industry that year resulted in a decline in regional population throughout the 1980s. Uintah County's population declined by an annual average of about 2.6 percent during this period, to 22,200 in 1989. The county's population has been on an upswing since 1990, increasing gradually during the 1990s and the first half of the next decade. The rate of population growth increased beginning in 2005 to an average annual increase of about 3.6 percent. This rate of increase was associated with increased activity in natural gas exploration and development. The 2010 U.S. Census showed Uintah County's population had reached an all-time high of 32,588.

Housing

Population growth in the late 1970s and early 1980s also created a residential construction boom in Uintah County, as illustrated in Figure 3-3. From 1975 to 1978, Uintah County averaged about 273 new residential buildings per year. This increased to an annual average of 418 new buildings per year from 1979 to 1982. A significant number of multiple-unit dwellings must have been constructed in 1983, as the number of units constructed in that year spiked while the number of new buildings plummeted from 515 in 1982 to 74 in 1984. This was followed by a bust, where residential construction nearly ceased for the remainder of the decade. A new construction boom commenced in 2002 and continued through 2009. During this period, new building construction averaged about 283 structures per year, with a peak of 537 new structures in 2006. The 2006 building year was also a peak in terms of the value of residential construction, which suggests that higher-valued residences were constructed during this period. Higher-value nonresidential construction was also built in the 2006–2008 timeframe.

Tourism

Natural and historical resources in Uintah County have drawn tourists for many years, bringing economic benefits. Destinations include Dinosaur National Park, Flaming Gorge Reservoir, Steinaker State Park, Red Fleet State Park, museums, and Uintah County's Western Park multi-activity conference complex. The county strives to balance increased recreation and tourism with the area's rural lifestyle and traditional resource uses (Uintah County 2005). Travel and tourism accounted for 1,236 Uintah County jobs in 2010 and traveler spending totaled $65.7 million, which ranked Uintah County 14th among Utah's 29 counties (Utah Office of Tourism 2012).

Research by the Utah Division of State Parks and Recreation (State Parks) found that Steinaker Reservoir is a primary destination for park visitors and most visitors appear to be local. State Parks has also estimated that visitors supported approximately $288,376 in local wages, earnings, rents, and tax revenues within Uintah County in 2009. Since many visitors are local, however, much of these expenditures do not represent money that is "new" to the regional economy. Through its operations at Steinaker Reservoir, State Parks itself paid just more than $7,000 in sales and use taxes and, along with Red Fleet State Park, paid $2,593 in transient room taxes to Uintah County (State Parks 2011).

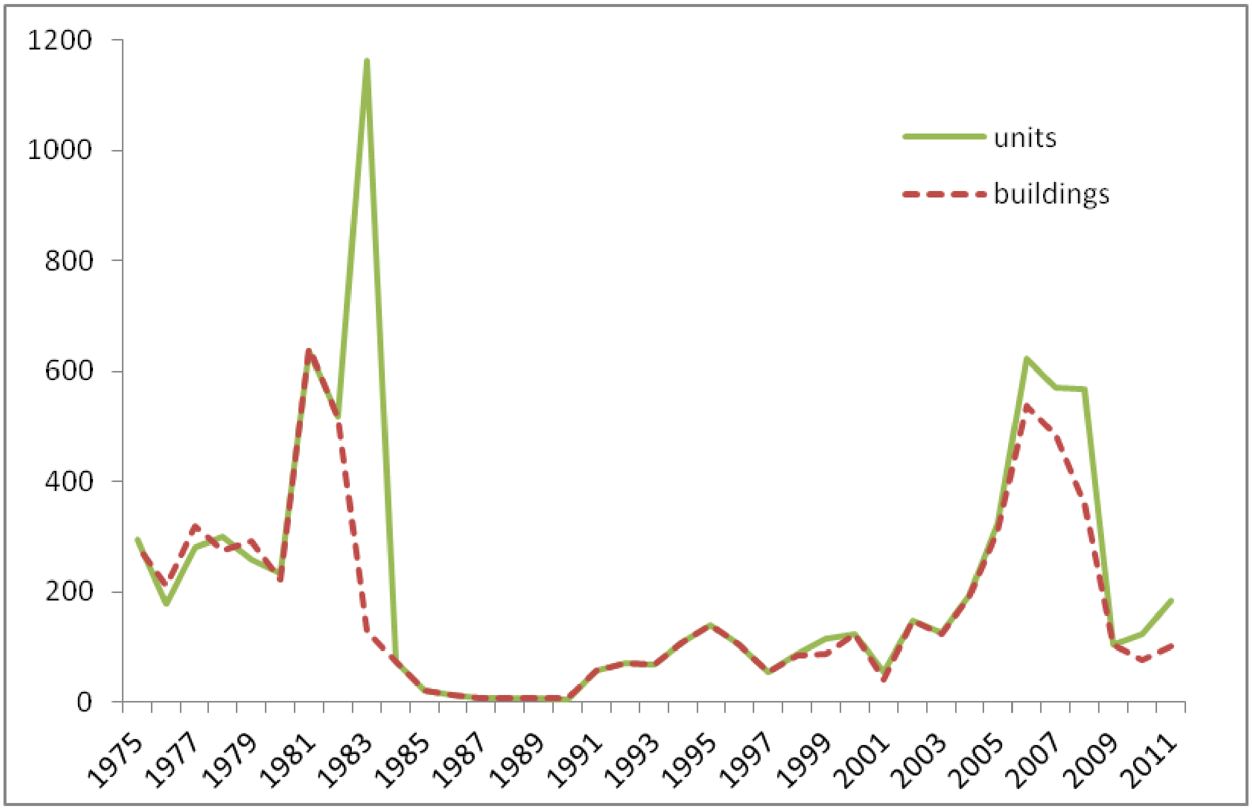

Figure 3-3. Uintah County New Residential Construction, 1975–2011 (BEBR 2012).

Environmental Justice

Environmental Justice refers to the protection of human rights, particularly those of minority and lower-income populations. It further means that, to the greatest extent practicable and permitted by law, minority and low-income groups are provided the opportunity to participate prior to decision making and are not affected in a disproportionately high and adverse manner by government programs and activities affecting human health or the environment. In addition, Environmental Justice means that such populations are allowed to share in the benefits of and are not excluded from the due processes associated with government activities that involve human health and the environment. Environmental Justice is included in this document in compliance with Executive Order 12898, signed in 1994.

According to data from the U.S. Census Bureau (2012), Uintah County had a population of 32,588 in 2010; this was a 29 percent increase from the population count of 25,224 in 2000. The majority of the population in both of these census years was predominantly white alone/not Hispanic or Latino, with nearly 86 percent of the population in 2000 and about 83 percent in 2010. Approximately 3.5 percent of the population was Hispanic or Latino in 2000, which increased to just over 7 percent in 2010. The largest minority race category in both 2000 and 2010 was Native American, with 2,599 persons in 2000 and 2,905 persons in 2010.

Uintah County median household income in 2010 was $59,730. This median income level was $3,400 above the state median. In 2010, 11.7 percent of Uintah County's population lived at or below the poverty level. This was 3.2 percent higher than the state average but 2.1 percent below the United State average poverty level.

Partnerships

The U.S. Department of the Interior (DOI), Bureau of Reclamation (Reclamation) owns a total of 1,880 acres at Steinaker Reservoir. This figure includes the full pool surface area of the reservoir, 829 acres. Water operations, recreation facilities, fish and wildlife resources, minerals, and other resources are managed through the following interagency partnerships.

Water Operations and Water Rights

Steinaker Dam water operations were turned over to the Uintah Water Conservancy District (UWCD) in a contract which became effective January 1, 1967. Reclamation retains title to the Steinaker Dam, water rights, reservoir, surrounding land, canals, and appurtenant works, while UWCD has a permanent right to the use of water within the provisions of the contract. The UWCD supplies irrigation water to about 14,781 acres of agricultural lands in the Ashley Valley (Reclamation 2011a).

Recreation Management

With the signing of a Memorandum of Agreement between Reclamation and Utah Division of State Parks and Recreation (State Parks) in 1974, and subsequent agreements, State Parks has managed recreation at Steinaker Reservoir. The agreements obligate State Parks to administer recreation and to operate, maintain, and replace recreational facilities. Water-based activities, such as swimming, waterskiing, pleasure boating, and fishing, are the prominent attractions at Steinaker Reservoir. Other activities include sunbathing, picnicking, camping, sightseeing, hiking, and biking.

Fish and Wildlife Management

The Utah Division of Wildlife Resources (UDWR) has full authority to enforce state fishing and hunting regulations within the Study Area. By regulation, shotgun and archery hunting are not permitted in state parks within 0.25 miles of developed recreational areas where camping, picnicking, boating, and other activities take place. The UDWR conducts a fisheries stocking program at Steinaker Reservoir and works with Reclamation, State Parks, and other entities in providing fishing and wildlife enjoyment opportunities for all persons.

The U.S. Fish and Wildlife Service (USFWS) is responsible for working with Reclamation in protecting fish and wildlife and their habitats under the auspices of the Fish and Wildlife Coordination Act (1958 as amended). Reclamation is responsible for management and recovery of Threatened and Endangered Species within the Study Area under the Endangered Species Act of 1973 (ESA), as amended, with recommendations and consultation provided by the USFWS.

Minerals Development and Withdrawn Lands Management

Through an Interagency Agreement dated December 1982, Reclamation and the U.S. Bureau of Land Management (BLM) agreed to coordinate on land-use planning, land resource management, land conveyance and exchange, and cooperative services. The agreement brings coordinated agency efforts into compliance with existing laws and policies. The agreement provides that Reclamation will, when requested, provide expertise in water resources conservation, development, and management, to be utilized by the BLM in preparing its RMPs. The agreement further provides that the BLM will, when requested, provide expertise in land resource, forest, range, oil, gas, and mineral management, to be utilized by Reclamation when preparing its RMPs and in managing public lands administered, acquired, or withdrawn by Reclamation.

Law Enforcement and Fire Suppression

Law enforcement and fire suppression activities are primarily provided by State Parks, UDWR, Uintah County, and the Uintah Basin Interagency Fire Center.

Road Maintenance

Access to Steinaker State Park (State Park) begins on U.S. Route 191 (US-191) and proceeds northwesterly on State Route 301 (SR-301) a distance of 1.7 miles to the boat ramp at the park. State Route 301 is under the jurisdiction of the Utah Department of Transportation (UDOT) and is maintained by UDOT (Utah Code 72-3-206).

Water Quality

The Utah Department of Environmental Quality (UDEQ), Division of Water Quality (UDWQ) is responsible for ensuring that state water quality standards and beneficial uses are met for surface waters within the Study Area.

Water Resources

This section provides a detailed description of the Steinaker Reservoir watershed, water operations, and water quality conditions. Sources of information consulted to develop this description of existing conditions included U.S. Geological Survey (USGS) gage station records, UDWQ reports, Reclamation reports, U.S. Environmental Protection Agency (EPA) Storage and Retrieval (STORET) water quality data, consultations with agency personnel, and onsite observations during a field visit in October 2011.

Watershed

Steinaker Reservoir is an off-channel reservoir that stores water diverted from Ashley Creek. Water is diverted from the creek into the Steinaker Feeder Canal at the Fort Thornburgh Diversion Dam about 4 miles northwest of Vernal. The total watershed area, illustrated in Figure 3-4, is approximately 167,900 acres. This includes both the Ashley Creek and Dry Creek sub-basins. The headwaters of Ashley Creek originate high in the Uinta Mountains at a peak elevation of approximately 12,200 feet above sea level. The majority of the Ashley Creek watershed area is located within the Ashley National Forest, while the southern portion of the watershed includes lands managed by the BLM. Ashley Creek is a tributary to the Green River with its confluence near Jensen, Utah (Crosby and Bartlett 2005).

A USGS gage (09266500) records flows on Ashley Creek at a site about 6 miles upstream of the Fort Thornburgh Diversion. This is the closest gage to the diversion point, but it is located upstream of the Dry Creek confluence and, therefore, it represents only part of the total flow in the creek at Fort Thornburgh Dam. Several other significant diversions occur on Ashley Creek

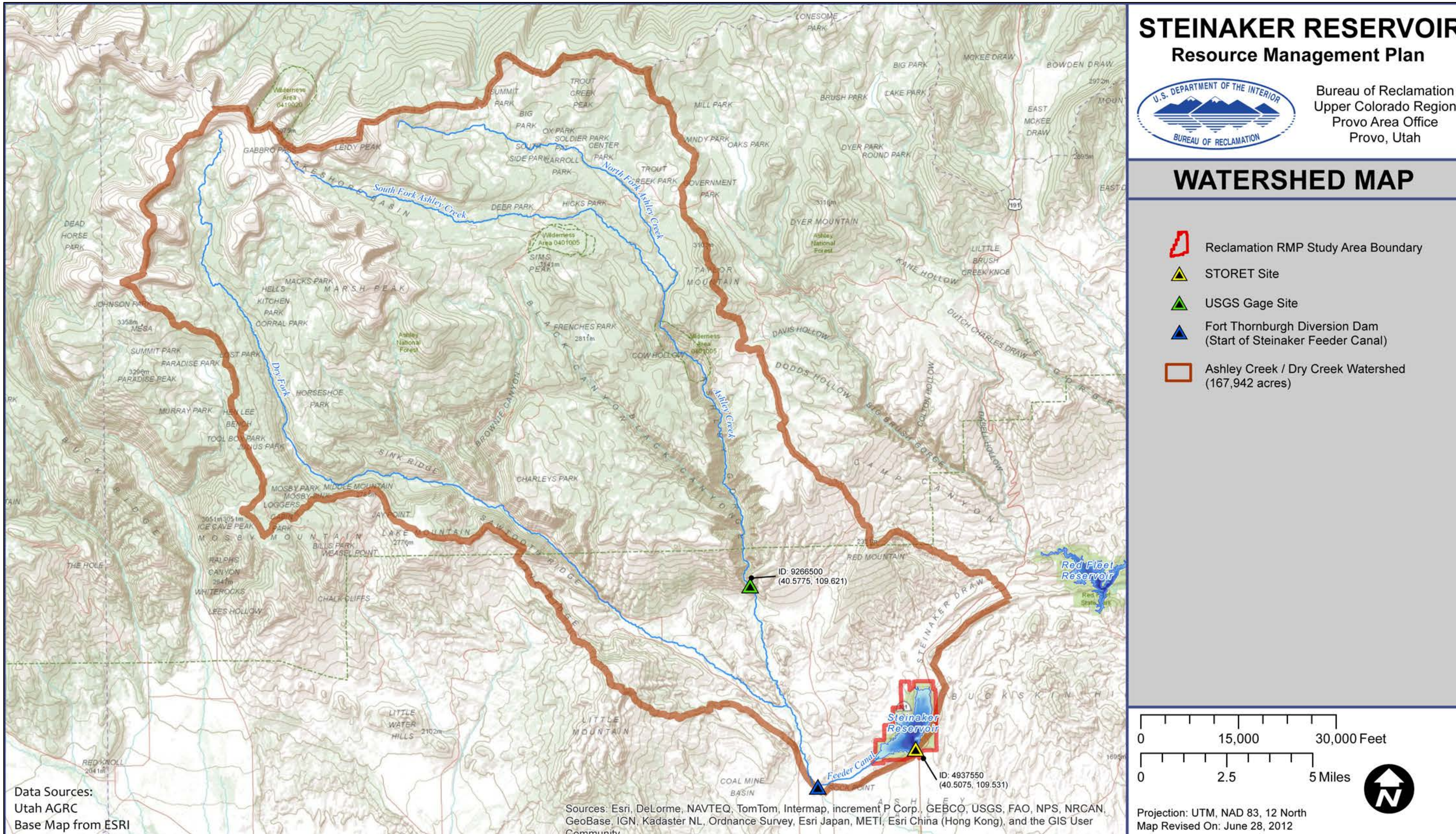

Figure 3-4. **Steinaker Reservoir Resource Management Plan (RMP) Study Area Watershed Map.**

between the USGS gage and Fort Thornburgh Dam. Although the USGS gage does not take these flow contributions and withdrawals into account, it does provide an indication of the overall seasonal patterns and hydrologic regime of the creek. Therefore, daily flow data were analyzed for water years 1980 through 2010. Mean annual discharge for this time period is approximately 92.8 cubic feet per second (cfs). The largest instantaneous peak flow recorded at this site was 4,100 cfs on June 15, 1995. Average peak flow for the 1980–2010 time period is 1,353 cfs. The Ashley Creek hydrograph is largely driven by snowmelt runoff. Peak flow generally occurs in May. A secondary flow peak is sometimes observed in early fall, a result of “monsoon” rainstorms. Figure 3-5 shows a typical annual hydrograph for Ashley Creek. Except during the spring snowmelt period, Ashley Creek is commonly dewatered below Fort Thornburgh Dam, which diverts flows into the Steinaker Feeder Canal and four other major canals.

Reservoir

Steinaker Reservoir is an off-channel impoundment of Ashley Creek, which drains from the eastern Uinta Mountains. Water is supplied by the Steinaker Feeder Canal, which receives water through the Fort Thornburgh Diversion Dam on Ashley Creek (Reclamation 2007, UDWQ 2011a). Water impounded in Steinaker Dam is supplied to the Steinaker Service Canal, which delivers water to various canals and ditches throughout Ashley Valley. A siphon on the Service Canal that makes it possible to release water (up to 300 cfs) from the canal back into Ashley Creek south of the Steinaker Reservoir; however, this return system is not typically used unless unusual conditions require water to be spilled from the reservoir (Reclamation 2007).

Reclamation’s daily water elevation data from October 1979 through September 2010 are illustrated in Figure 3-6. Typical seasonal fluctuations are on the order of 25 to 35 feet, which is a typical pattern for a reservoir managed for irrigation storage. Reservoir levels during the first few months of the water year are primarily a function of conditions at the end of the previous year. Levels then increase during winter and spring when there is no demand for irrigation water and high snowmelt runoff flows are available for diversion. Typically, about 200 to 300 cfs (Figure 3-7) are diverted from Ashley Creek into the Steinaker Feeder Canal during the springtime high-flow period (Reclamation 2007). Water levels in the reservoir drop during summer and fall when water is released for irrigation and withdrawals into Steinaker Feeder Canal are minimal. This seasonal pattern holds during dry, average, and wet water years, but the rates, timing, and magnitude of the fluctuations vary.

Typical wet, average, and dry years were determined based on USGS gage data for Ashley Creek and are illustrated in Figure 3-8. In dry water years (e.g., 1988), water levels increase more slowly, drop more rapidly and to lower levels, and do not completely fill the reservoir. Prior to 2005 Steinaker Reservoir was operated with a normal pool elevation of 5,517.8 feet, meaning that this was the typical full-reservoir elevation reached in springtime (Figure 3-6). Beginning in 2005 the reservoir has been operated with a normal pool elevation of 5,520.5, which equals the spillway crest elevation of Steinaker Dam. Reclamation completed an EA in 2007 (Reclamation 2007) that found this change would allow for increased carryover storage of irrigation water without causing any significant environmental impacts.

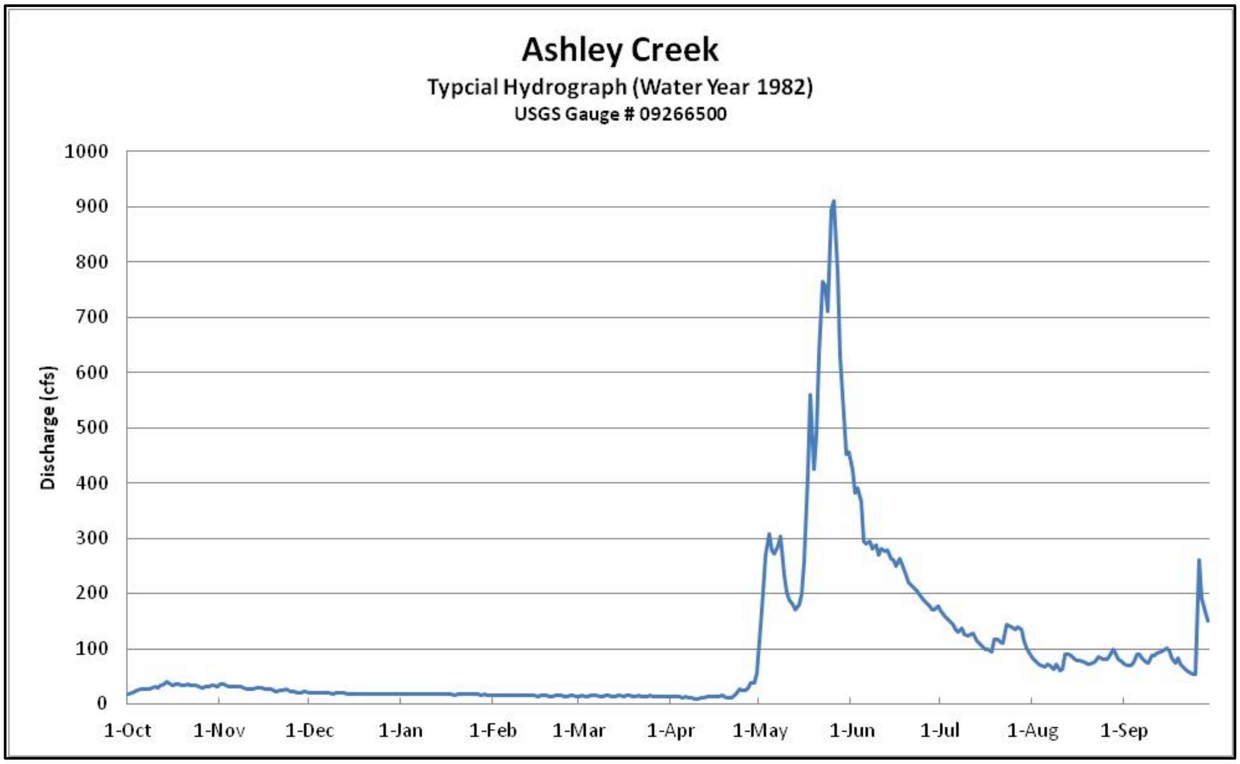

Figure 3-5. Typical Hydrograph for Ashley Creek 6 Miles Upstream of the Fort Thornburgh Diversion.

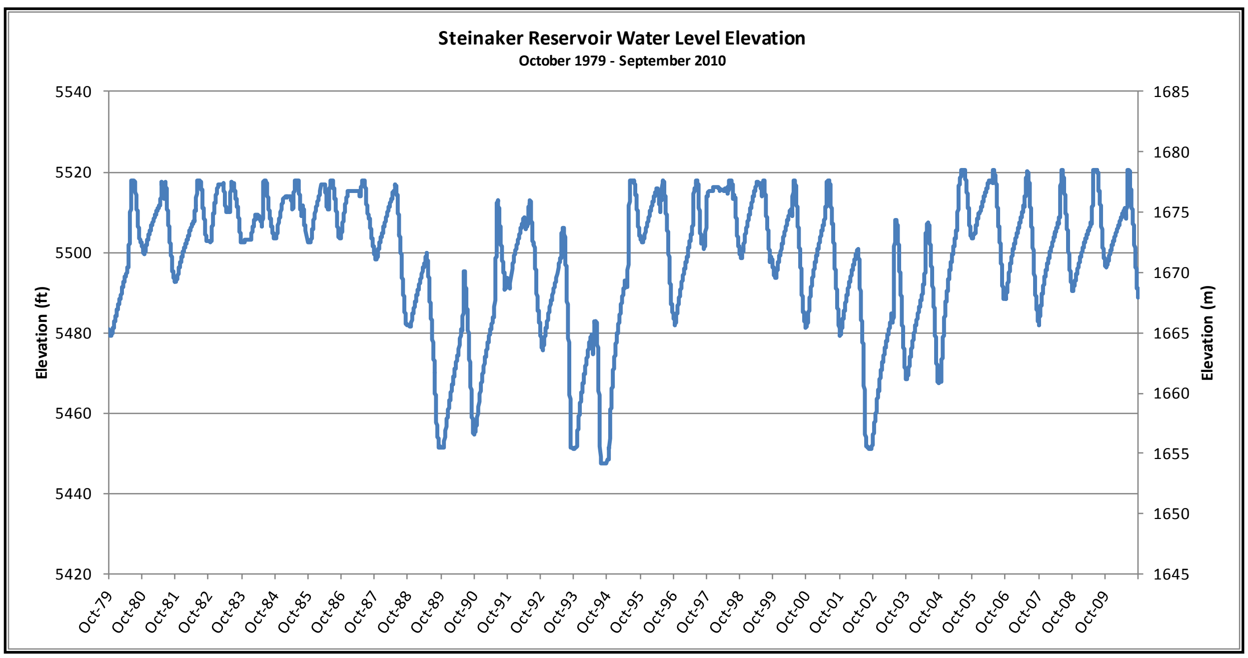

Figure 3-6. Daily Steinaker Reservoir Water Levels for Water Years 1980–2010.

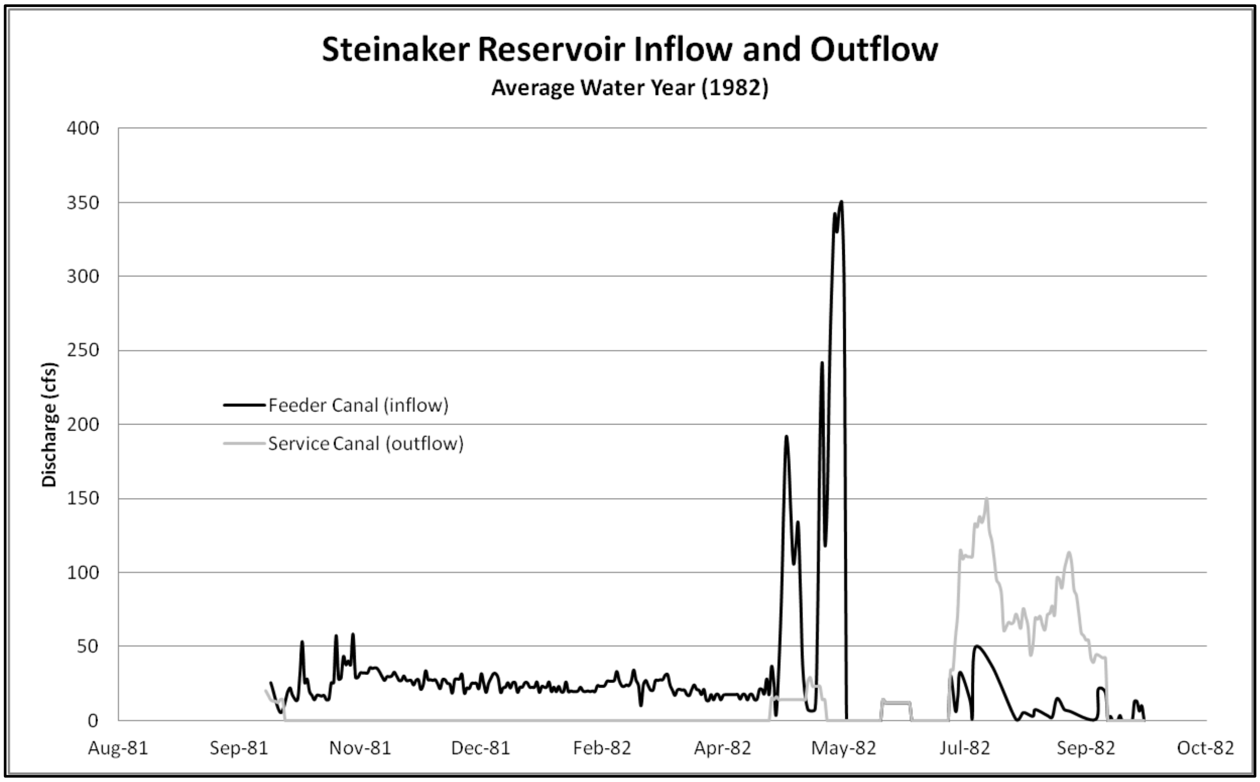

Figure 3-7. Steinaker Reservoir Inflows and Outflows during an Average Water Year.

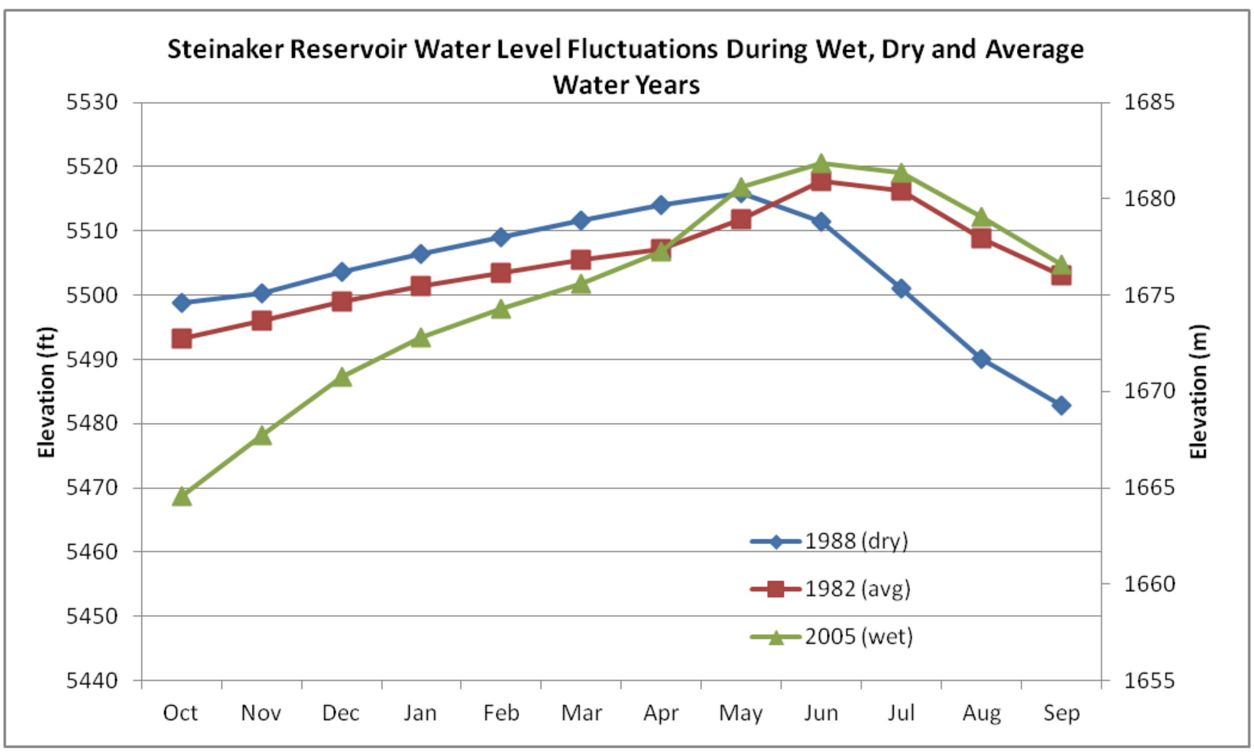

Figure 3-8. Monthly Steinaker Reservoir Water Level Fluctuations during Wet, Dry, and Average Water Years.

Sedimentation

Quantitative studies on sedimentation rates in Steinaker Reservoir have not been completed. Sediment inputs from the Steinaker Feeder Canal are most likely low relative to a natural creek because most bedload sediment is assumed to be trapped at the Fort Thornburgh Diversion Dam. However, potentially significant amounts of suspended sediment are most likely conveyed through Steinaker Feeder Canal into Steinaker Reservoir during the spring snowmelt period, when a relatively large portion of Ashley Creek's flow is diverted. Some evidence of fine sediment deposition at the canal inflow point can be seen in available aerial imagery; apparent deposition has also occurred at the north end of Steinaker Reservoir where flows from Steinaker Draw enter the reservoir. In the past, high flows and sediment from Steinaker Draw have washed out the entrance road to the State Park. Data are not available to quantify these sediment inputs.

Field observations indicate that shoreline erosion also contributes sediment to Steinaker Reservoir. Conditions are often windy, contributing to wave action. Areas of shoreline erosion can be seen on the south shore of the reservoir west of the dam and on the east shore north of the dam. During a field visit in October 2011, a short vertical wave-cut cliff was also evident in the constructed beach areas on the western shore; it is assumed that this cut bank is associated with wave action during periods when the reservoir is full.

The developed portions of the State Park are other potential sediment sources. Soils in the developed parts of the State Park are very sandy and susceptible to erosion, and rills and gully erosion occur in association with drainage from some paved parking areas and concrete pathways.

Non-motorized trails, user-created trails, and other high foot-traffic areas are additional sources of sediment within the Study Area. For example, erosion was observed along the southeast part the Eagle Ridge trail where it crosses a steep, sandy slope near the reservoir. Along portions of the eastern shore of the reservoir, user-created trails and heavy foot traffic associated with fishing access have trampled vegetation, compacted soils, and increased the potential for erosion in the area.

Floodplain Functions

The primary inflow and outflow of Steinaker Reservoir are canals with controlled flow that do not function as natural streams and do not have functioning natural floodplains. Steinaker Draw, a smaller natural tributary that enters Steinaker Reservoir from the north, does not appear to support perennial flow or significant floodplain functions within the Study Area. Outside the Study Area, below Fort Thornburgh Diversion, flows on Ashley Creek are typically dewatered except during the snowmelt runoff period in spring. The loss of natural baseflows on lower Ashley Creek has likely affected riparian vegetation, bank stability, and other floodplain functions. Additional detailed studies beyond the scope of this document would be needed to quantify the type and extent of such effects.

Water Quality

As previously noted Steinaker Reservoir is an off-channel reservoir that receives water from the Ashley Creek drainage through a feeder canal. The State has assigned Ashley Creek from the reservoir to the creek headwaters as having designated beneficial use classifications 1C, 2B, 3A, and 4. These classes are described in Table 3-2. According to the 2010 Integrated Report (UDWQ 2011b), Ashley Creek currently meets all water quality standards and is attaining its designated beneficial uses. Steinaker Reservoir has beneficial use classes 1C, 2A, 2B, 3A, and 4. In 2010, the State identified temperature as a cause of impairment to the coldwater aquatic life beneficial use class, 3A (UDWQ 2010). The state also previously listed Steinaker Reservoir as impaired by low dissolved oxygen levels, but recently removed the listing, related to a change in EPA's Total Maximum Daily Load (TMDL) for dissolved oxygen (UDWQ 2010).

Table 3-2. Designated Beneficial Use Classes and Attainment Status.

BENEFICIAL USE CLASSES	DESCRIPTION	ATTAINMENT STATUS	
		Ashley Creek	Steinaker Reservoir
1C	Domestic Water Source (with prior treatment)	Attained	Attained
2A	Frequent Primary Contact Recreation (swimming, kayaking)	Not a designated use	Attained
2B	Infrequent Primary Contact Recreation (fishing, hunting)	Attained	Attained
3A	Coldwater Aquatic Life	Attained	Impaired (2010), low-priority TMDL
4	Irrigation	Attained	Attained

Source: UDWQ (2011b).

Temperatures measured above Steinaker Dam at STORET station 4937550 (USEPA 2011) indicate that during July, water temperatures at the surface exceed the state numeric criteria of 20 degrees Celsius for Class 3A streams (Figure 3-9). The July data illustrate how high air temperatures create a lens of warmer water at the surface, while water temperatures remain consistent below 10 meters. In contrast, data from October (Figure 3-10) show a much less pronounced difference between water temperatures at the surface and at depth. Solar radiation is likely the primary source of increases in temperature. Water level management also affects temperature, but has some positive effects through turnover of lake water on a seasonal basis. Other factors such as wind and surface disturbance from boats may also facilitate mixing, at least in shallower portions of the reservoir.

State Parks has also noted cyanobacteria present at the reservoir and algal blooms often occur in September (M. Murray 2011, pers. comm.). Because the Steinaker Feeder Canal inflow point is located fairly close to Steinaker Dam, flow circulation in the northern two-thirds of the reservoir may be limited, and this would facilitate conditions favorable to algal blooms.

With respect to dissolved oxygen concerns, Steinaker Reservoir is considered to be a mesotrophic to oligotrophic (low productivity) water body (UDWQ 2010). This limits the potential extent of the dissolved oxygen concern. Dissolved oxygen is used when organisms are active and respiring and also when organic matter decomposes. During the day, photosynthesis increases dissolved oxygen levels. Under eutrophic conditions, dissolved oxygen concentrations tend to drop overall and may go to very low levels or even become anoxic at night.

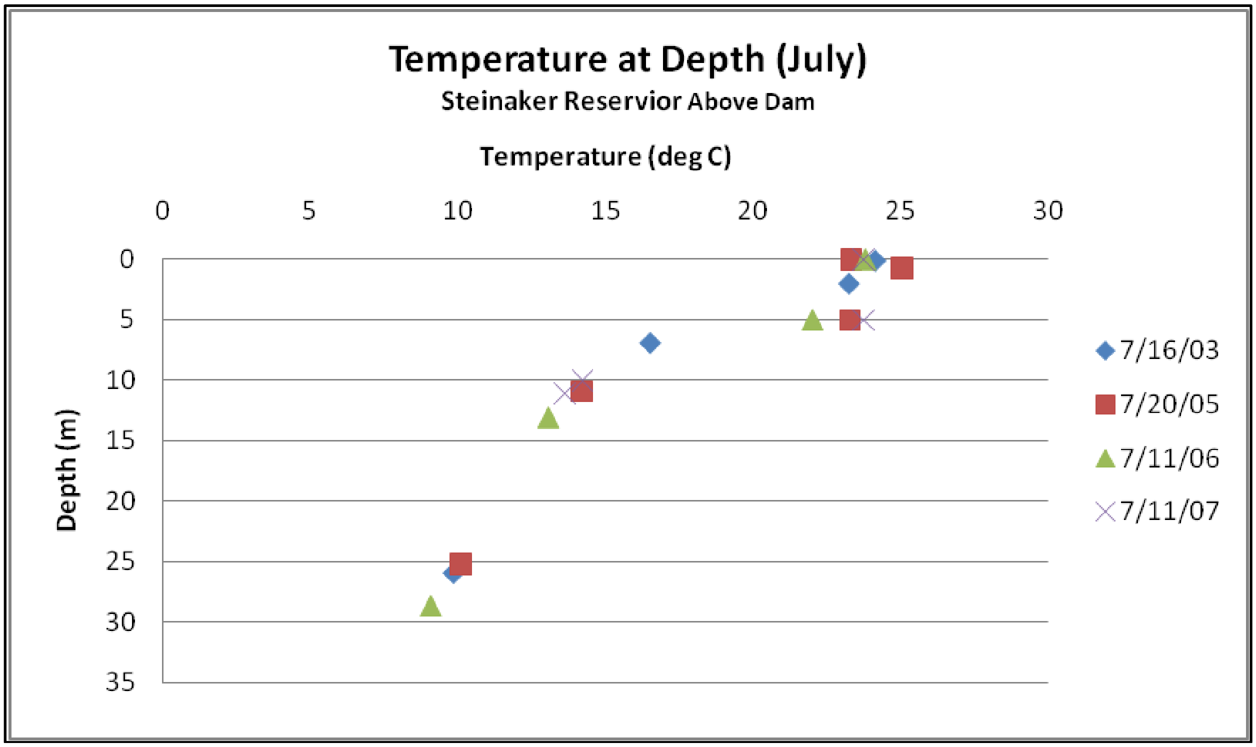

Figure 3-9. July Water Temperatures at Indicated Depths at STORET Station 4937550 (USEPA 2011).

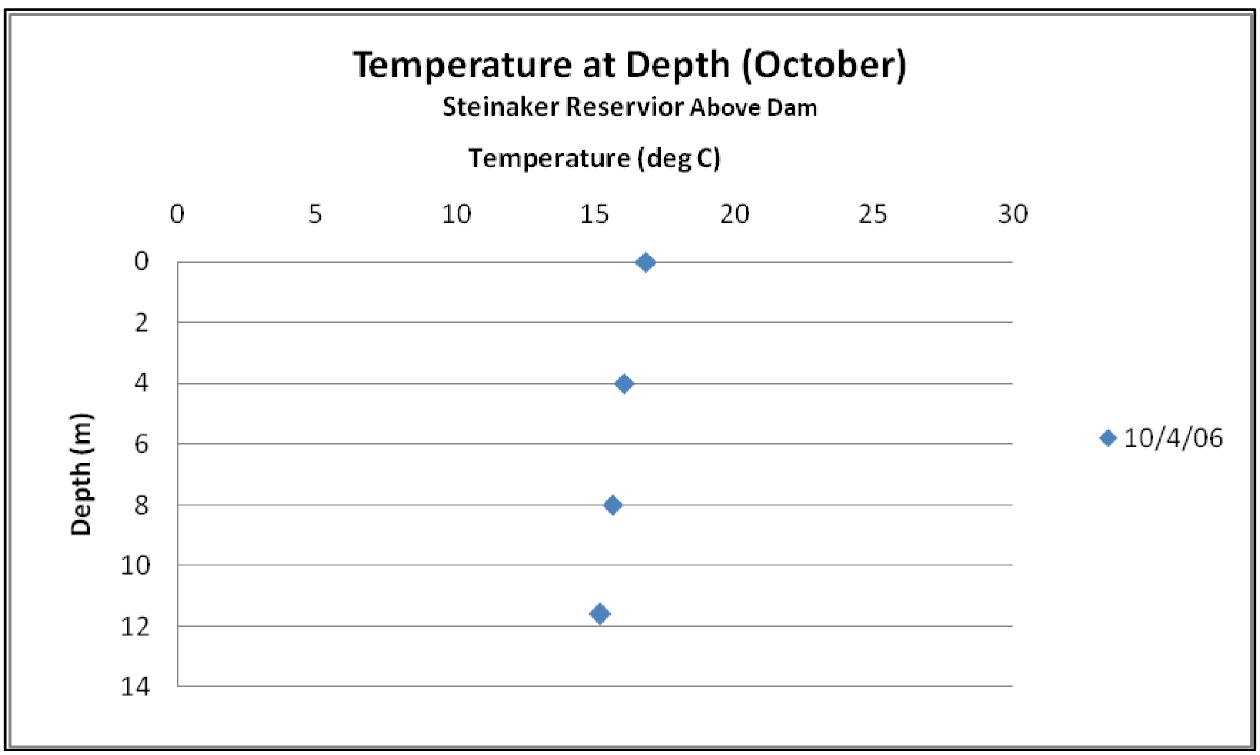

Figure 3-10. October Water Temperatures at Indicated Depths at STORET Station 4937550 (USEPA 2011).

If additions of nitrogen and phosphorus (often associated with sewage and organic matter) were to increase, the reservoir could become eutrophic. There have been instances when measurements at depth have exceeded the state numerical criteria for phosphorus (0.025 milligrams per liter); however, this is usually not the case, and elevated nutrient levels are not considered to be a major concern at Steinaker Reservoir. There are no upstream wastewater treatment plants that could result in long-term elevated phosphorous levels for water entering the reservoir.

The most obvious nonpoint source of potential pollutants is stormwater runoff from the paved surfaces surrounding the reservoir. Stormwater from the parking areas will transport debris and pollutants that have deposited on the paved surface including oils and grease, nutrients, trash, and pet waste. In addition, stormwater may cause erosion and rilling off of the paved areas, which would facilitate transport of sediment to the reservoir. In areas with inadequate riparian buffers along the edge of the reservoir, stormwater easily and directly enters the reservoir. Some land uses in the watershed outside of Reclamation property are also sources of nonpoint source pollutants; logging and grazing in the watershed are listed by the state as existing nonpoint sources (UDWQ 2011a) for sediment and nutrients. Overall, however, sediment and nutrient levels are not creating a water quality concern for Steinaker Reservoir at the present time.

Other water quality health concerns at reservoirs can include bacteria and heavy metals. Bacteria, such as *E. Coli* and cryptosporidium are currently issues at Steinaker Reservoir. Heavy recreational use and pet waste are the largest potential sources for bacteria and other human health-related water quality issues such as viruses. The restroom facilities at the reservoir include flush toilets at the campground and vault toilets at the day use beach areas. Vault toilets are good for helping to prevent human waste from unintentionally contaminating the water body. However, the current availability of vault toilets may be lacking in some areas that currently receive high levels of recreation use, such as the eastern shoreline of the reservoir. This may pose a concern for bacteria contamination. The existing flush toilet facilities at the campground are on septic systems. If poorly maintained or situated, septic systems can be another potential source of bacteria pollution. In terms of heavy metals, the state has issued fish consumption advisories for largemouth bass and bluegill from Steinaker Reservoir (UDWQ 2010). These advisories are indicative of mercury occurring in the water column; however, the current mercury levels do not impair water quality.

Recreation and Visual Resources

Recreation activities within the Study Area are managed by State Parks for outdoor public recreation purposes. Access to the Study Area is provided by SR-301 off US-191 approximately 5.6 miles north of downtown Vernal. Sources of information used to develop this assessment of existing recreation and visual resources included State Parks reports, tourism websites, Reclamation reports and technical guidance documents, BLM's visual resource management system, consultation with agency personnel, and field observations made in fall 2011 and summer 2012.

Recreation Opportunities and Facilities

The dominant recreational opportunities and attractions at Steinaker Reservoir are water-based activities including fishing, swimming, waterskiing, pleasure boating, and personal watercraft use. Camping, picnicking, hiking, sightseeing, and sunbathing are also enjoyed in conjunction with the water-based activities. The reservoir provides year-round recreation opportunities; ice fishing continues through winter. Motorized and nonmotorized riding trails are located nearby.

By regulation 43 CFR § 420.2, Reclamation lands are closed to off-highway vehicle (OHV) use, except where specifically designated as open and in accordance with a public process specified in §420.21. By state regulation (R651-411-2), OHV use is allowed only within designated areas at State Parks. At present, Reclamation has not designated any areas, roads, or trails as open to OHV use at Steinaker Reservoir.

The Study Area has been divided into seven management areas which are shown in Figure 1-3. Recreation facilities within each management area are described below.

State Park Area

Access to the State Park Area is provided by SR-301, approximately 1.7 miles from the US-191 intersection. The developed campground sits on a slope overlooking Steinaker Reservoir and offers 31 sites including 8 full hookups and 8 partial hookups (electric only) for recreational vehicles (RVs) and 15 standard campsites. The sites are suitable for tents and RVs up to 35 feet long. Mature trees provide shade at many sites, and there are flush toilets available. There is a developed day-use area with a 38-stall asphalt parking lot, picnic tables, 2 picnic pavilions, 5 vault toilets, and a group day-use pavilion that must be reserved. Other day-use facilities include a boat ramp, boat trailer parking area, and fish cleaning stations. The reservoir can accommodate a maximum of 34 boats based on designated parking stalls at the ramp area and an overflow boat parking area. There are plans for an accessible fishing dock to be located near the boat ramp. There is a single vault toilet at the boat ramp. There is also a group-camping/day use area across a cove from the general-use camping area which includes 7 back-in sites with no hookups, a double vault toilet, and a picnic pavilion with 8 tables, a fire pit and a barbeque pit, and 13 designated parking stalls. The group site accommodates a maximum of 50 people.

Entrance fees are $7 for day use including watercraft launches, $4 day use for Utah seniors 62 years and older, $75 for an annual pass, and $35 for a Senior Adventure (annual) Pass. The State Park is open year-round with no holiday closures. Summer hours are 6:00 a.m. to 10:00 p.m.; winter hours are 8:00 a.m. to 5:00 p.m. (Utah.com 2012). There is one hiking trail within the State Park Area, located on Eagle Ridge, which provides an overview of the reservoir.

Scenic Byway Area

The Scenic Byway Area shown in Figure 1-3 includes the portion of Reclamation lands located along US-191. The highway is part of the Flaming Gorge-Uintas National Scenic Byway. The scenic byway consists of portions of US-191 and State Route 44 (SR-44), and is approximately 80 miles long. The south end of the scenic byway starts in Vernal at the intersection of US-40 and US-191. It runs north on US-191, passes Steinaker and Red Fleet Reservoirs, enters the Ashley National Forest, climbs into the Uinta Mountains, and leaves Utah into Wyoming after crossing Flaming Gorge Dam. This scenic byway was designated as Utah’s first Forest Service Scenic Byway in 1988. It was added to the National Scenic Byways system on June 9, 1998.

There are informational signs along the byway explaining the geology of the area. Visitors can use turn-outs, view areas, and nature trails to view and explore the high desert and forested landscape. There is a visitor center near the junction of US-191 and SR-44 at Red Canyon Overlook which provides vistas of Flaming Gorge Reservoir. The Flaming Gorge-Uintas National Scenic Byway is listed on the “Fall Colors Tour” at Utah.com (FGCOC 2012, Utah.com 2012).

Within the Study Area, there is an interpretative boardwalk trailhead located just south of the entrance to Steinaker State Park. This trailhead is one of the 18 Flaming Gorge-Uintas National Scenic Byway designated sites. There is a parking area with 24 designated parking stalls, double vault toilets, and information kiosk located at the trailhead. There are two informal vehicle turn-outs along US-191 within the Scenic Byway Area where travelers can stop to enjoy overlooks of Steinaker Reservoir. These pullouts are also used for parking by day users and can accommodate approximately 31 vehicles. On busy days these areas become full and additional parking occurs in non-designated areas along both sides of US-191. No fees apply to this area.

Honda Hills Area

The Honda Hills Area shown in Figure 1-3 is informally used as a parking and staging area for OHV riding. This area is used to access locally popular riding areas outside of Reclamation-managed lands. There are currently no developed facilities located within this management area and no fees are required.

Entrance Area

This area is accessed from the Scenic Byway and includes a portion of the entrance road (SR-301). There is an existing trailhead along the entrance road that provides access to the reservoir, with parking space for approximately 8 vehicles. No fees apply to this area.

Inflow Area

This is an undeveloped area surrounding the portion of the Primary Jurisdiction Zone where the Steinaker Feeder Canal enters Steinaker Reservoir. Public access is limited to foot traffic or from boats along the shoreline. There are currently no developed public facilities in this area and no fees are required.

Primary Jurisdiction Area

This area includes Steinaker Dam and lands surrounding the dam and the Steinaker Feeder Canal. For the protection of public health, safety, and welfare, public access to this area and recreational uses (including trail use) are not permitted unless approved by Reclamation and the UWCD. These areas are used primarily by anglers who fish from the dam or shoreline. Public access is limited to foot traffic or from boats along the shoreline. No fees apply to this area.

Reservoir Inundation Area

This area includes the reservoir water surface at full pool. Developed public facilities include the movable floating boat dock. State park entrance fees apply to this area.

Visitation and Visitor Characteristics

According to visitation information collected from State Parks, the majority of visitations to Steinaker Reservoir occur from May to September. These figures also indicate that the months of

June, July, and August are typically peak months for visitation during the year. Further evaluation of these figures also indicates that visitation levels have consistently risen over the last 9-year period. At this time, accurate annual visitation rates are available for 2003 through 2011. A summary of visitation rates for these years is contained in Table 3-3.

Table 3-3. Summary of Annual Visitation at Steinaker Reservoir from 2003 to 2010.

YEAR	NUMBER OF VISITORS	PERCENT (%) CHANGE PER YEAR
2003	35,400	(not applicable)
2004	27,612	-28.21
2005	35,136	27.25
2006	45,615	29.82
2007	57,621	26.32
2008	70,312	22.03
2009	73,378	4.36
2010	81,517	11.09
2011	91,434	12.17

Source: State Parks (2012).

Recreation Conflicts and Concerns

No current information concerning the public's perception of recreation opportunities at Steinaker Reservoir is available at this time. Therefore, no specific information is available concerning user conflicts within the Study Area. There was a "swimmer's itch" outbreak during Summer 2012, which hasn't happened for approximately 14 years. Swimmer's itch is a short-lived skin rash caused by an immune reaction to water-borne parasites. Factors that likely contributed to the outbreak include increasing water temperature, algal growth, and rapid water draw down (M. Murray, pers. comm., 2012a).

Water and Land Recreation Opportunity Spectrum Analysis (WALROS)

An analysis and classification of the recreation opportunities that currently exist within the Study Area is included in this section. The analysis was conducted using the Water and Land Recreation Opportunity Spectrum (WALROS) system developed by Reclamation (Reclamation 2011b). The WALROS is modeled after the Recreation Opportunity Spectrum, or ROS, and Water Recreation Opportunity Spectrum, or WROS, systems, but is updated and tailored for use on land and water resources such as reservoirs, lakes, rivers and bays.

The WALROS system is a means by which the water and land related recreation opportunities of an area can be inventoried and mapped by classes. This is accomplished by analyzing the physical, social, and managerial setting components for each use area (Reclamation 2011b). The WALROS system characterizes the type of experience a visitor could expect when visiting a particular area. The scale of degree of major development for the six major classifications, shown in Table 3-4, range from fully developed (Urban) to completely undeveloped (Primitive). The WALROS classifications serve as the basis from which to compare future WALROS levels associated with various land and water resource use strategies.

Table 3-4. Scale of Degree of Major Development Used in WALROS Classifications.

URBAN (U)	SUBURBAN (SU)	RURAL DEVELOPED (RD)	RURAL NATURAL (RN)	SEMI PRIMITIVE (SP)	PRIMITIVE (P)
80–100%	50–80%	20–50%	10–20%	3–10%	0–3%
Dominant	Very prevalent	Prevalent	Occasional	Minor	Very minor
Extensive	Widespread	Common	Infrequent	Little	Very little
A great deal	Very obvious	Apparent	Periodic	Seldom	Rare
Extremely	Very	Moderately	Somewhat	Slightly	Not at all

Source: Reclamation (2011b).

The six major recreation opportunity classes were mapped and inventoried using protocols from Reclamation’s handbook (Reclamation 2011b) and expert opinion. The recreation attributes that differentiate the WALROS classes are described in Table 3-5. Three attributes of the recreation setting are assessed—physical setting, managerial setting, and social setting. Using these attributes, a rating from 1 (Urban) to 11 (Primitive) is given to inventoried sites.

Table 3-5. Setting Descriptors by Attribute Categories Used in WALROS.

PHYSICAL ATTRIBUTES	SOCIAL ATTRIBUTES	MANAGERIAL ATTRIBUTES
• Degree of development • Sense of closeness to a community • Degree of natural resource modification • Distance to development on or adjacent to a water resource • Degree that natural ambiance dominates the area	• Degree of visitor presence • Degree of visitor concentration • Degree of recreation diversity • Distance to visitor services, security, safety, comforts, and conveniences • Degree of solitude and remoteness • Degree of non-recreational activity	• Degree of management structures • Distance to on-site developed recreation facilities and services • Distance from developed public access facilities • Frequency of seeing management personnel

Source: Reclamation (2011b).

A WALROS analysis showing the current recreation opportunities was developed for the seven management areas defined for Steinaker Reservoir, which are illustrated in Figure 1-3. The results are presented in Table 3-6 and are illustrated on Figure 3-11. The inventory was conducted during Fall 2011 by the Project Team. Each management area was treated as an inventory site. The physical, social, and managerial attributes were noted on a WALROS inventory protocol sheet. Project Team members circled the degree extent or magnitude that each attribute was rated and the results were compiled for each management area. Then a map was created showing the WALROS class in each management area.

Visual Resources

Visual resources include the visible physical features on a landscape, such as land, water, vegetation, animals, structures, and other features. A viewshed is the landscape that can be directly seen under favorable atmospheric conditions from a specific viewpoint or along a transportation corridor (BLM 1984). For the purposes of this RMP project, the Study Area falls under one viewshed.

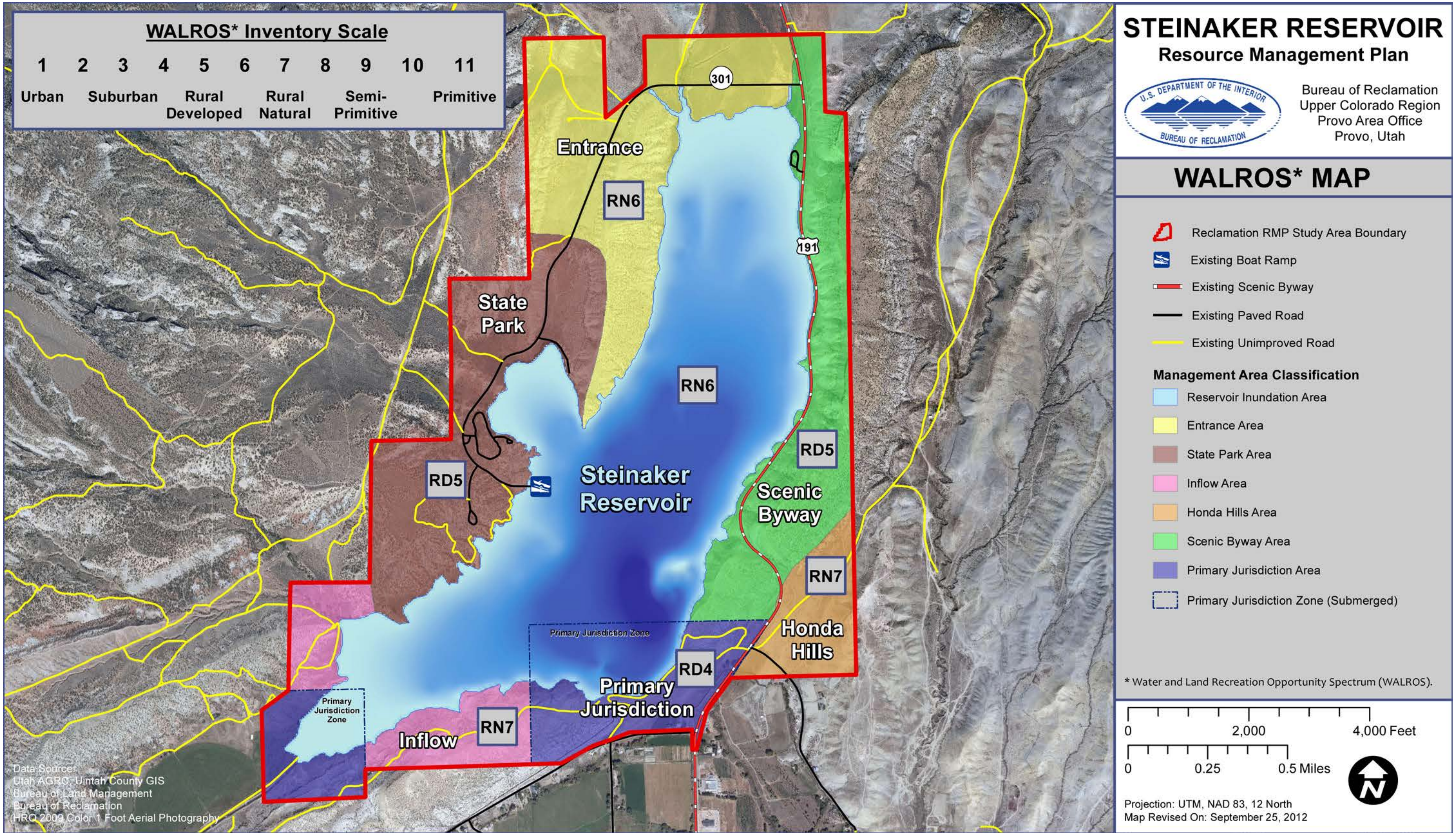

Figure 3-11. Steinaker Reservoir Resource Management Plan (RMP) Study Area WALROS Map.

Table 3-6. Setting Attribute Ratings and Overall WALROS Classification for Each Steinaker Reservoir Management Area.[a]

MANAGEMENT AREA (INVENTORY SITE)	PHYSICAL SETTING ATTRIBUTE RATING	SOCIAL SETTING ATTRIBUTE RATING	MANAGEMENT SETTING ATTRIBUTE RATING	OVERALL WALROS CLASSIFICATION
Scenic Byway Area	RD5	RD6	RD5	RD5
Entrance Area	RN6	RN7	RN6	RN6
State Park Area	RD6	RD4	RD4	RD5
Inflow Area	RN7	RN8	RN7	RN7
Primary Jurisdiction Area	RD4	RD5	RD4	RD4
Honda Hills Area	RN7	RN8	RN7	RN7
Reservoir Inundation Area	RN6	RN6	RN6	RN6

[a] See Table 3-4 for abbreviation descriptions and Figure 3-11 for numeric scale descriptions.

The BLM Visual Resource Management (VRM) system (BLM 1986) was used as the technical approach to assess and classify the existing visual setting that may be experienced by visitors to Steinaker Reservoir. The VRM system is designed to inventory existing scenic values and provide baseline visual conditions for assigning visual resource management objectives to lands under BLM agency management and to determine whether a proposed action/alternative will meet those management objectives. The primary objective of the VRM is to maintain the existing visual quality of BLM-administered public lands and to protect unique and fragile visual resources. In short, the VRM system identifies visual values, establishes objectives for managing those values, and provides a means to evaluate proposed projects to ensure that visual resource management objectives are met. The BLM VRM system was used because of the existence of BLM lands surrounding the Study Area and because it is best suited for this type of characteristic landscape within the Study Area.

There are two phases of work involved in the VRM assessment process: (1) Visual Resource Inventory (VRI) and (2) analysis of the Visual Resource Contrast Rating.

For the VRI, three factors are considered: scenic quality rating, sensitivity level, and distance zones. From the inventory process, landscape units are assigned one of four visual resource inventory classes as described in the BLM Handbook H-8431-1 (BLM 1986). For the Visual Resource Contrast Rating analysis, potential visual impacts from the project RMP alternatives are analyzed to determine whether proposed activities would meet the management objectives established for the Study Area from the VRI. A visual contrast rating process is used in the analysis, which involves comparing the proposed project features with the major features in the existing landscape using the basic design elements of form, line, color, and texture. The analysis is then used as a guide for resolving visual impacts. Potential visual impacts, including the Visual Resource Contrast Rating analysis, are discussed in Chapter 4: Environmental Consequences.

The first step in the VRM inventory for the Study Area involved identifying the existing BLM visual classes on surrounding BLM lands. The BLM has classified lands under their jurisdiction immediately adjacent to and in the vicinity of Steinaker Reservoir in their RMP. The BLM's

Vernal Field Office RMP was completed in October 2008. All adjacent BLM sections that border the edges of the Study Area were designated as Class III (BLM 2008).

The VRI phase for the Study Area followed the VRM process, which has four steps. These steps are (1) establishing scenic quality rating, (2) performing sensitivity level analysis, (3) delineating distance zones, and (4) determining visual resource classes by overlay methods. Data collected included USGS quadrangle maps, GoogleEarth maps, aerial photographs, surface photographs, Study Area maps, and maps of existing BLM lands and visual resource classes. These data were used to analyze vegetation types, land uses, and landscape character. Fieldwork consisted of driving and walking designated travel routes and visiting recreation destinations within the Study Area.

The following Steinaker Reservoir VRI analysis provides a description and classification of the Study Area's visual landscape character associated with the natural and cultural lines, forms, colors, and textures that are reflected in land, rock, vegetation, and water forms.

Regional Setting and Landscape Character

The Study Area is located in the Uinta Basin physiographic section of the larger Colorado Plateaus province. Uinta Basin is rimmed by the Wasatch Range on the west, the Uinta Mountains on the north, Roan Plateau on the south, and runs east into western Colorado. The region is characterized by high mountain terrain, fertile valleys, and rugged and stark uninhabited canyon lands.

The landscape character surrounding the Study Area exhibits a range of natural and developed landscapes. U.S. Highway 191 winds through the Steinaker Draw area to the north.
The Buckskin Hills to the east are dry and dusty and top out close to 7,000 feet elevation. Ashley Valley to the south includes the city of Vernal, the surrounding small towns, and agricultural land.

Vegetation types outside of developed areas are typically upland vegetation communities where the exposed rock dominates the landscape with scattered trees, shrubs, and sparse grasses. There are riparian-wetland vegetation communities with larger trees that are found on the reservoir's fringe and along tributary streams.

Scenic Quality Rating

Scenic quality is the overall impression retained by the observer after driving through, walking through, or flying over an area of land (BLM 1986). It is a measure of the visual appeal of a tract of land where those with the most variety and the most harmonious composition have the greatest scenic value. Rating scenic quality requires an understanding of the landscape characteristics and a description of the existing scenic values. A landscape is first divided into subunits called scenic quality rating units (SQRU) that appear homogeneous in terms of landscape characteristics, similar visual patterns, and similar man-made modifications. The size of the SQRUs may vary from several thousand acres to 100 acres or less, depending on the homogeneity of the landscape features and the detail desired in the inventory. For this inventory, the Study Area was assumed to be a single SQRU, as it appears to be a similar homogeneous landscape type from key observation points and along the dominant paths of travel.

The SQRUs are rated by seven key factors: landform, vegetation, water, color, influence of adjacent scenery, scarcity, and cultural modification. Using a standardized point system, values for each category are calculated and, according to total points, three Scenic Quality Classes are determined. Class A areas combine the most outstanding characteristics, Class B areas combine both outstanding features and fairly common features, and Class C areas have features fairly common to the physiographic region (BLM 1986).

The Study Area SQRU landscape character features are dominated by panoramic views of water framed by surrounding hills. The landscape forms include the wide, flat, horizontal plane of the water surface with rounded and amorphous hills and ridges rising above. The characteristic lines include the horizontal lines of the water's edge meeting the angular land forms and continuing to the rounded outlines of silhouetted hills. The shoreline is undulating with convex slopes contrasting with the small vertical wave-cut cliffs. Landscape colors include blues and grays of the water as well as grays, reds, and browns of the exposed rock and earth, and the vegetation colors of light and dark greens. The landscape texture is dominated by the contrast of the smooth water surface and the medium-course texture of the patchy vegetation growing on the surrounding hillsides. Exposed rock dominates the ridgelines and slopes along the northwest portion of the Study Area with scattered trees, shrubs, and a sparse herbaceous layer. The riparian and wetland vegetation colors and textures provide a contrast with the surrounding shrublands and mixed salt desert scrub. Based on these characteristics, the Study Area was judged to be rated with a scenic quality score of 21, which makes it a Class A classification.

Sensitivity Level

Sensitivity levels are a measure of public concern for scenic quality, where lands are assigned high, medium, or low sensitivity levels by analyzing various indicators of public concern (BLM 1986). These include interest in and public concern for a particular area's visual resources, an area's degree of public visibility, the level of use of an area by the public, and the type of visitor use that an area receives (BLM 1984). The sensitivity of viewers in the Study Area's viewshed is determined based on viewing duration, use volumes, and aesthetic concerns. Sensitive viewing areas typically include residences, common travel routes, recreational areas, and special areas.

The sensitivity level for users visiting Steinaker State Park was determined to be medium based on the following findings: (1) the reservoir is a regional recreational destination, (2) there are expectations that the Study Area will retain the characteristics of the surrounding viewshed, (3) the geology and biology of the Study Area are of local interest (not of national significance), (4) access to the Study Area via US-191 is a primary travel route and national scenic byway, and (5) the man-made reservoir was constructed to supply downstream water to farmers for crop irrigation purposes.

Distance Zones

The visual quality of a landscape may be magnified or diminished by the visibility of the landscape from sensitive viewpoints. As such, distance plays a key part in VRM where visible details in the landscape or the scale of objects being observed depend on the proximity of the viewer. Because areas that are closer have a greater effect on the observer, they require more attention than do areas that are farther away. Distance zones allow this consideration of the proximity of the observer to the landscape (BLM 1980).

There are three distance zones described in the VRM process: foreground-middleground, background, and seldom seen. These distance zones are based on the relative visibility from key observation points and primary travel routes. The foreground-middleground zone includes areas seen from highways, water routes, or other view locations less than 3 to 5 miles away. Areas seen beyond the foreground-middleground zone but are less than 15 miles away are considered background. Areas that are not seen as either foreground-middleground or background are in the seldom-seen zone. For the Study Area, the foreground-middleground distance zone encompasses all Reclamation lands from key observation points and primary travel routes.

Visual Resource Class

By combining the results of the scenic quality rating, sensitivity level, and distance zones, the Study Area was determined to be Class II. The objective of Class II, as described in the BLM Visual Resource Inventory Handbook (BLM 1986), is as follows:

> The objective of [Class II] is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Natural and Cultural Resources

This section provides detailed descriptions of existing conditions for Study Area resources including geology, soils, vegetation, wildlife, fisheries, special-status species, cultural, paleontological, and extractive resources. The Study Area was also inventoried for possible Indian Trust Assets (ITAs), to determine consistency with DOI and Reclamation policies for fulfilling ITA obligations, and for any environmental hazard conditions.

Geology

Sources of information used to develop this assessment of geologic conditions included published literature, USGS reports, and field observations made in October 2011. The Study Area is located on the margin of the southern slope of the western Uinta Mountains and Ashley Valley. The Uinta Mountains are an east-west trending, 150-mile-long mountain range consisting of Quaternary- to Precambrian-aged rocks formed during a period of Cretaceous uplift (USGS 1975). Vernal is located in Ashley Valley, which is approximately 6 miles wide and 9 miles long.

Figure 3-12 depicts the Study Area geology, and Table 3-7 lists the geologic units found within the Study Area, along with their associated age, map symbol, and a summarized description of the unit modified from Haddox et al. (2010).

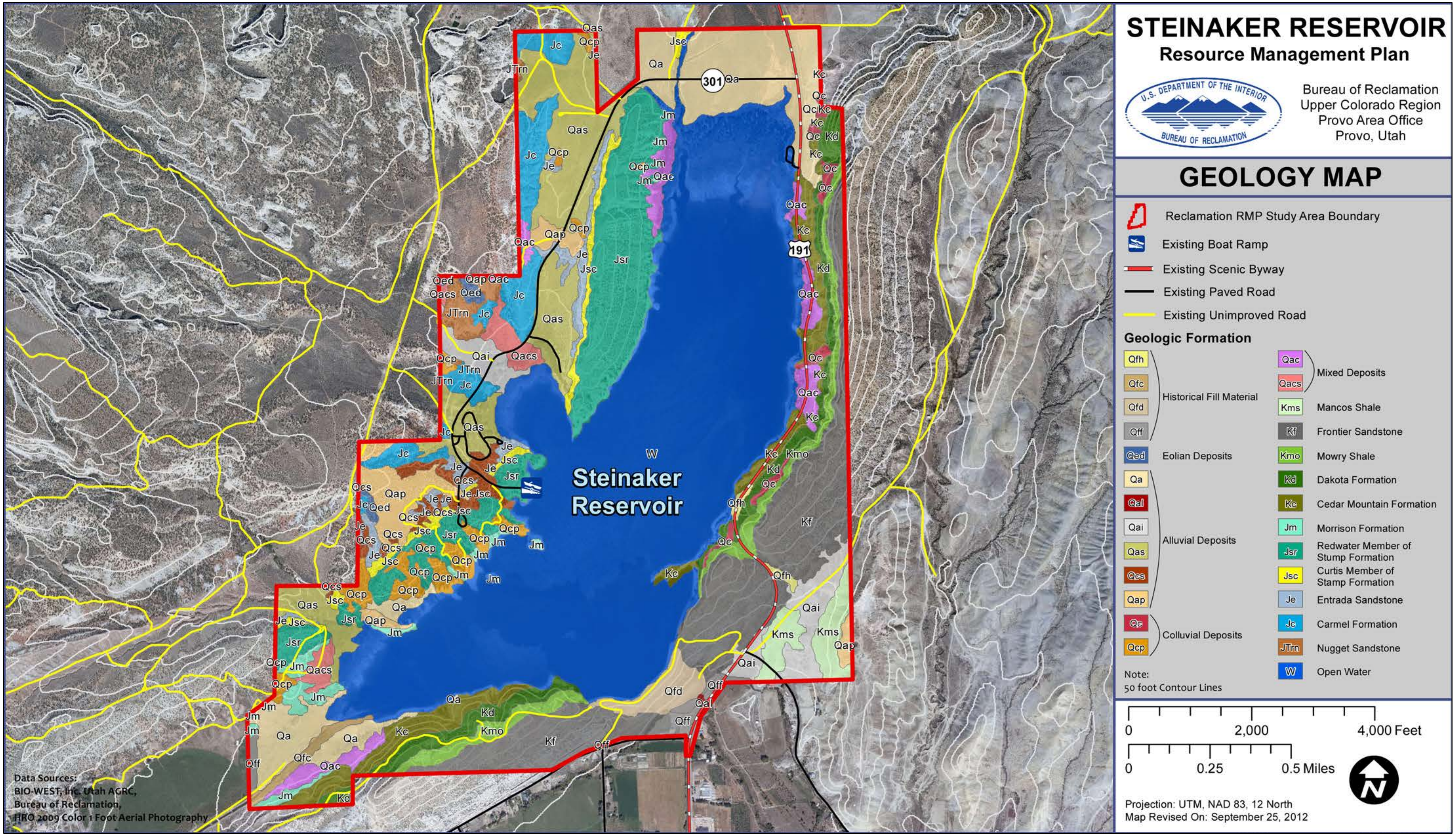

Figure 3-12. Steinaker Reservoir Resource Management Plan (RMP) Study Area Geology Map.

Table 3-7. Geologic Units Located within the Study Area.

GEOLOGIC AGE/TYPE	MAP SYMBOL	DEPOSIT DESCRIPTION
Quaternary Deposits	Qfh, Qfc, Qfd, Qff	Historical fill material, including highway fill, canal levee fill, dam-related fill, and farm-related fill.
	Qa, Qal, Qai, Qas, Qat, Qap	Alluvial Deposits (Holocene to Upper Pleistocene) - Alluvial deposits composed of various grain sizes. Thickness ranges from less than 10 to 30 feet.
	Qc, Qcp	Colluvial Deposits (Holocene to Upper Pleistocene) - Poorly-sorted colluvial deposits composed of various grain sizes. Thickness is less than 10 feet.
	Qed	Eolian Deposits (Holocene) - Eolian dune deposits composed of well-sorted, fine-grained sand. Thickness is less than 10 feet.
	Qac, Qacs	Mixed Deposits (Holocene to Pleistocene) - Composed of mixed alluvium and colluvium of various grain sizes. Thickness ranges from less than 10 to 30 feet.
Cretaceous Sedimentary Rocks	Kms	Mancos Shale (Upper Cretaceous) - Shale, dark to medium gray; minor color change and lithology change, from varying degrees of siltstone and mudstone throughout the formation; marine origin; forms badlands topography. As much as 4,700 feet thick.
	Kf	Frontier Sandstone (Upper Cretaceous) - Interbedded sandstone and shale with localized coal; sandstone is medium- to coarse-grained and ledge-forming; shale is calcareous and slope-forming; formation contains large carbonate concretions. 140–270 feet thick.
	Kmo	Mowry Shale (Upper Cretaceous) - Shale, bluish gray, interbedded with thin bentonitic ash beds; contains abundant fish scales; marine origin. 90–120 feet thick.
	Kd	Dakota Formation (Lower Cretaceous) - Sandstone and conglomerate interbedded with shale; sandstone is coarse-grained with conglomeratic lenses and cliff-forming; shale is carbonaceous, contains petrified wood at the base, and is slope-forming; fluvial to marine origin. 115–140 feet thick.
	Kc	Cedar Mountain Formation (Lower Cretaceous) - Mudstone interbedded with limestone, conglomerate, and minor sandstone lenses and beds; mudstone contains calcic paleosols that weather to form limestone nodules; the formation also contains chert pebbles and gastroliths that commonly weather out; slope-forming; fluvial-lacustrine origin. 210 feet thick.
Jurassic Sedimentary Rocks	Jm	Morrison Formation (Upper Jurassic) - Mudstone interbedded with conglomerate and sandstone; mudstone is variegated, ashy, and commonly slope-forming; pebbly conglomerate and sandstone lenses are channel forming and ledge-forming; fluvial-lacustrine origin. 520–650 feet thick.
	Jsr	Redwater Member of Stump Formation (Upper Jurassic) - Sandstone and limestone interbedded with shale; sandstone is glauconitic; limestone is sandy, oolitic, and ledge-forming; shale contains gypsum and belemnites and is slope-forming; marine origin. 180 feet thick.
	Jsc	Curtis Member of Stump Formation (Upper Jurassic) - Sandstone; coarse-grained, cross-stratified, glauconitic; marine origin. 40–90 feet thick.
	Je	Entrada Sandstone (Middle Jurassic) - Two sandstone beds bounded by siltstone and mudstone beds; sandstone is medium-grained, friable, and commonly slope-forming; siltstone and mudstone are slope-forming; sandstone has eolian origin and siltstone/mudstone has fluvial origin. 160–215 feet thick.
	Jc	Carmel Formation (Middle Jurassic) - Upper formation is siltstone and lower formation is limestone with interbedded gypsum; siltstone is slope-forming; limestone is sandy, fossiliferous, contains jasperized fossils, and is ledge-forming; gypsum is thick and massive; marine to marginal marine origin. 150–220 feet thick.
Lower Jurassic/Upper Triassic Sedimentary Rocks	JTn	Nugget Sandstone (Lower Jurassic to Upper Triassic) - Sandstone; medium- to fine-grained; massive weathering with large-scale cross-beds; cliff-forming; Early Jurassic dinosaur tracks observed near the top and Late Triassic vertebrate tracks observed near the bottom of the formation. 720–1,030 feet thick.

The surficial geology of the Study Area is dominated by Quaternary sediment deposits and upper Cretaceous- to upper Triassic-aged sedimentary rock formations (Haddox et al. 2010). The Quaternary deposits within the Study Area consist of Holocene to Pleistocene deposits derived from adjacent uplands. The types of deposits include alluvial, colluvial, eolian, and mixed-deposit material. The mode of sediment transport and sediment size of these deposits is variable and depends primarily on the grain size and lithology of the deposit's parent rock.

Upper Cretaceous to lower Jurassic/upper Triassic sedimentary rock formations underlie the Quaternary deposits at the Study Area, and provide much of the material for the deposits (Haddox et al. 2010). The sedimentary rock formations consist of mudstone, shale, siltstone, sandstone, coal, conglomerate, and limestone. Haddox et al. (2010) mapped two folds within the Study Area. The axes of both folds trend in a northwest-southeast direction. The southern fold is an anticline that runs through the center of the Study Area, and the northern fold is a syncline that runs through the northern portion of the Study Area.

Seismic Activity

There is one mapped fault in the Study Area (Haddox et al. 2010). The fault is located along the western margin of the Study Area, is a dip-slip fault, and has approximately 0.1 mile of surface exposure. Additionally, Haddox et al. (2010) has mapped several dip-slip and strike-slip faults within 3 miles of the Study Area. Most of these faults trend in northwest-southeast directions. All of the mapped faults are discontinuous and have surface exposure of less than 1 mile. Seismic hazard mapping by the USGS (2011) has placed the Study Area within a zone that has a 2 percent probability of exceedance in 50 years of a 0.15 Peak Acceleration (%g) earthquake. A 0.15%g earthquake generally produces strong perceived shaking and light potential for damage (USGS 2006). Therefore, although the potential for seismic activity exists at the Study Area, there is a very low probability that seismic activity would produce significant damage.

Liquefaction

It is possible that seismic events could trigger liquefaction in the Study Area because of the presence of sandy alluvial deposits and a presumed high-water table in portions of the Study Area. Sediments most susceptible to liquefaction include Holocene delta, river channel, flood plain, and eolian deposits that lack clay where the water table is less than 30 feet from the ground surface (EERI 1994). These depositional criteria are met immediately north and south of Steinaker Reservoir, within the valley bottom. The sediment at these locations is primarily Holocene, poorly consolidated alluvium with a shallow water table. As such, these areas have the highest potential for liquefaction within the Study Area.

Shoreline Erosion

Wave action from wind-generated and boat-generated waves, along with annual fluctuations in reservoir water levels, contribute to shoreline erosion at Steinaker Reservoir. The geomorphic areas most susceptible to erosion are points that protrude into the reservoir, convex shorelines, and steep shorelines covered by or composed of unconsolidated material. A significant factor in the degree of shoreline erosion is the shoreline's slope. The more gently sloping shorelines, which are generally protected from wave erosion by beaches, tend to erode much less than steeper shorelines.

The major process eroding and transporting shoreline sediments into Steinaker Reservoir occurs primarily when the reservoir is at full pool, allowing waves to impinge against the steep portions of the shoreline. The waves undercut a notch in the steeper shorelines, resulting in shoreline collapse. When a large enough volume of material has been eroded, the collapsed debris eventually forms a beach that then protects the highest shoreline from wave energy. This process is also adding sediment to the reservoir. The recent increase in water levels related to the alteration of the dam reset this process. Shorelines that may have been mostly stable are still adjusting to Steinaker Reservoir's new full-pool elevation. After the shoreline reaches a stable angle from beach formation, the hill behind the shoreline will also continue to erode to a more-stable angle. This process may take several decades. Areas of erosion were noted in sandy materials near the inflow in the southwest portion of the reservoir. Wave-cut cliffs were present along the east and southern shore of the reservoir. Minor erosion also occurs at lower reservoir levels when waves contact the shoreline below the high-water level.

Soils

According to the U.S. Department of Agriculture (USDA) web soil survey (USDA 2011), the Study Area consists of loam, clay loam, silt loam, sandy loam, silty clay loam, sandy loam, very cobbly and very gravelly loam, clay, silty clay, fine sand, and weathered bedrock (USDA 2011). The names and characteristics of the various soils found within the Study Area are summarized in Table 3-8 and shown in Figure 3-13. Silty clay loam and clay loam are the most prevalent soils in the Study Area, and are found along most of the reservoir shoreline and the northern, eastern, and southern portions of the Study Area. There is sand and sandy loam in the western portions of the Study Area. Only the Ohtog-Parohtog Complex, which comprises less than 2 percent of the Study Area, is rated as "prime farmland if irrigated" by the USDA (2011). The remainder of the Study Area is rated as "not prime farmland".

Sand has been hauled into the beach day-use areas along the west shore of Steinaker Reservoir to the south of the boat ramp. At lower water levels the shoreline in this area is naturally composed of mud. In addition to making the shoreline more attractive for day use recreation, the layer of sand creates "armor" over the underlying mud, reducing erosion and suspension of fine sediments in the water column in this area.

Soil Erosion

Soils in the Study Area are moderately susceptible to wind erosion. The USDA classifies soils based upon their Wind Erodibility Group, which classifies soils that have similar susceptibility to wind erosion in cultivated areas (USDA 2011). The soil groups range from 1 to 8, with group 1 representing soils that are most susceptible to wind erosion and group 8 representing soils that are least susceptible to wind erosion. Mespun Fine Sand and Reepo-Rock Outcrop Complex are classified as group 1, Greybull-Utaline-Badland Complex is classified as group 6, and the remainder of the soils are classified as either group 3 or 4 (USDA 2011).

Table 3-8. Soil Types Located within the Study Area.

SOIL NAME	PERCENT OF STUDY AREA SOILS	SLOPE (PERCENT)	DEPTH TO BEDROCK IN CENTIMETERS	SHRINK-SWELL POTENTIAL (0.00–1.00) [a]	LIMITATIONS	
					BUILDING SITE DEVELOPMENT [b]	SEPTIC [c]
Abracon Loam	7.99	3 to 8	>200	0.00	Not Limited to Somewhat Limited	Somewhat Limited
Badland-Montwell Complex	19.10	50 to 90	>200	0.50–1.00	Very Limited	Very Limited
Begay Sandy Loam	0.03	2 to 15	>200	0.00	Somewhat to Very Limited	Somewhat Limited
Gerst Loam	17.36	4 to 40	>200	0.00	Very Limited	Very Limited
Gerst Rock Outcrop Complex	21.45	4 to 40	>200	0.00	Very Limited	Very Limited
Greybull-Utaline-Badland Complex	1.53	8 to 50	>200	0.50–1.00	Very Limited	Very Limited
Hanksville Silty Clay Loam	6.58	2 to 25	>200	1.00	Somewhat to Very Limited	Very Limited
Mespun Fine Sand	3.29	4 to 25	>200	0.00	Very Limited	Very Limited
Mikim Loam	0.43	3 to 15	>200	0.50	Somewhat to Very Limited	Somewhat Limited
Mikim Silt Loam, Sodic	6.50	1 to 4	>200	0.50	Somewhat Limited	Somewhat Limited
Ohtog-Parohtog Complex	1.48	0 to 2	>200	0.50	Not Limited to Somewhat Limited	Somewhat to Very Limited
Paradox Loam	0.79	3 to 8	>200	0.00	Not Limited to Somewhat Limited	Somewhat Limited
Reepo-Rock Outcrop Complex	6.72	4 to 25	76	0.00	Very Limited	Very Limited
Shotnick Sandy Loam	1.56	4 to 8	>200	0.00	Not Limited to Somewhat Limited	Not Limited
Solirec Fine Sandy Loam	1.71	3 to 8	>200	0.00	Not Limited to Somewhat Limited	Somewhat Limited
Wyasket Loam	1.67	0 to 2	>200	0.50	Very Limited	Very Limited
Yarts-Paradox Complex	1.80	2 to 5	>200	0.00	Not Limited to Somewhat Limited	Not Limited to Somewhat Limited

Source: NRCS Web Soil Survey (USDA 2011).
[a] 0.00–1.00 is a scale of the severity of shrink-swell limitations. 0.00 represents no limitation and 1.00 represents a severe limitation.
[b] Building Site Development = shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets.
[c] Septic = septic tank absorption fields.

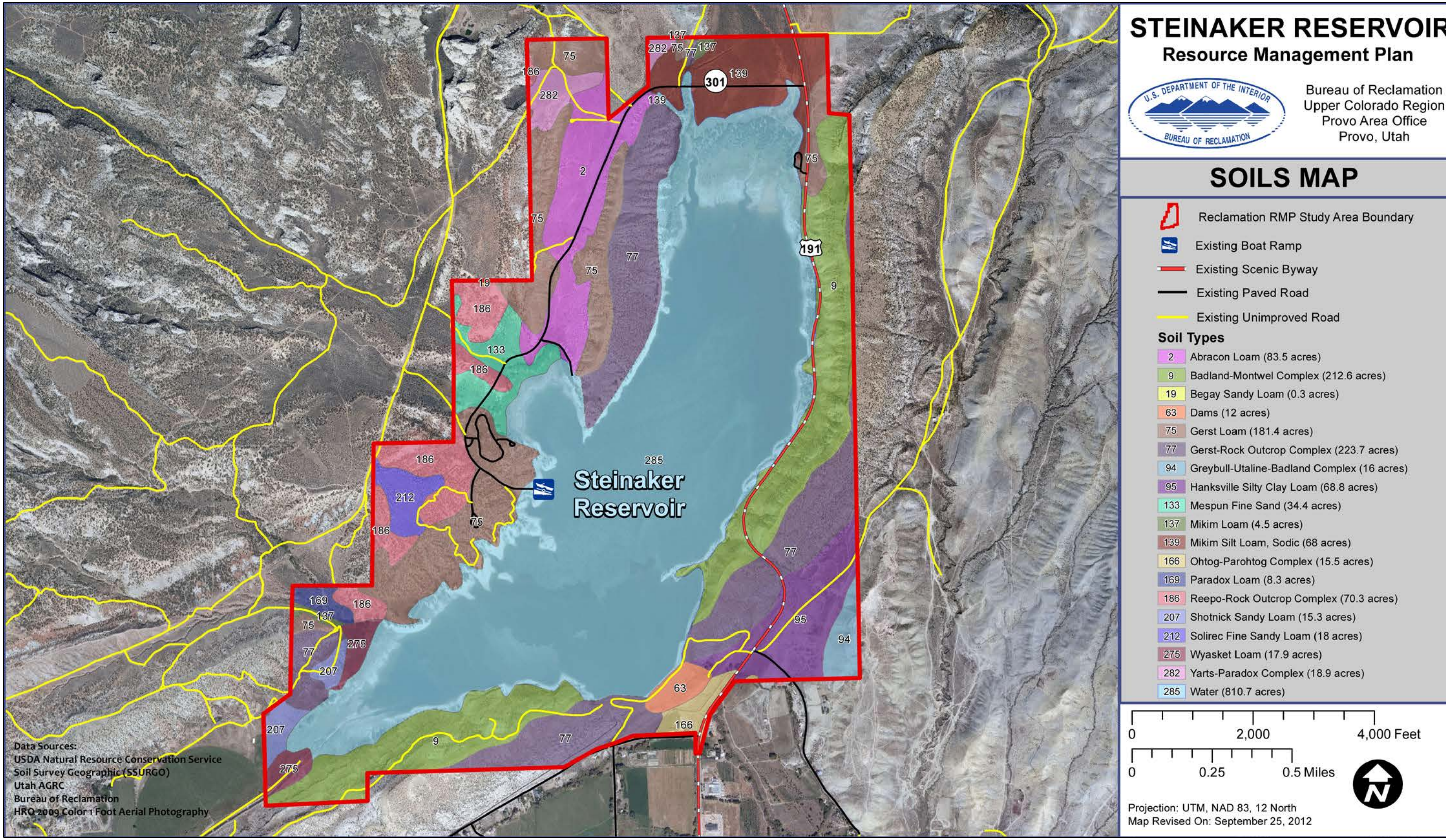

Figure 3-13. Steinaker Reservoir Resource Management Plan (RMP) Study Area Soils Map.

Soils in the Study Area are moderately susceptible to water erosion. The USDA rates soils based upon their susceptibility to sheet and rill erosion by water by assigning soils erosion factors. The erosion factor is based upon the percentages of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity. Erosion factor values range between 0.02 and 0.69. With all other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill water erosion (USDA 2011). Soils within the Study Area are rated between 0.10 and 0.49. The erosion factors of the Badland-Montwell Complex, Begay Sandy Loam, Greybull-Utaline-Badland Complex, and Wyasket Loam range between 0.10 and 0.20. The erosion factor of the Mikim Silt Loam Sodic is 0.49, and the erosion factors of the remainder of the soils range between 0.24 and 0.43.

Wave-cut erosion is active in the Gerst Loam in the southwest portion of Steinaker Reservoir. Wave-cut cliffs along the shoreline in this area extended in height up to 6.5 feet. The Badland-Montwell Complex soils are the other soils along the south and west shores are where wave erosion is most active.

Soil Limitations

Characteristics of soils, such as slope, depth to bedrock, and shrink-swell potential, are shown in Table 3-8. Shrinking and swelling of some soils can damage building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned soil use will not tolerate large volume changes (USDA 2011). Similarly, if steep slopes are present or depth to parent rock is shallow, additional building limitations may exist.

The Study Area soils are also rated in Table 3-8 according to soil limitations affecting their suitability for building site development and septic development. Building site development refers to the degree of soil limitations affecting shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets. The degree of soil limitations that affect the construction of septic tank absorption fields is based on soil permeability, depth to seasonal high-water table, depth to bedrock, and the area’s susceptibility to flooding. The degree of soil limitation is expressed as “not limited,” “somewhat limited,” or “very limited.” “Not limited” indicates that the soil has features that are very favorable for building or septic development, and that good performance and very low maintenance can be expected. “Somewhat limited” indicates that the soil has features that are moderately favorable for building or septic development, and that the limitations can be overcome or minimized by special planning, design, or installation. “Very limited” indicates that the soil has one or more features that are unfavorable for building or septic development, and that the limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures (USDA 2011). Generally, the soils within the Study Area are rated as either “somewhat limited” or “very limited.”

Utilization of Soil Resources

The majority of the soils in the Study Area currently support vegetation favorable for wildlife habitat and recreational activities.

Vegetation

This section describes the vegetation communities found in the Study Area. Upland vegetation communities are discussed first, followed by riparian-wetland communities. Figure 3-14 illustrates the distribution and acreages of these various classes within the Study Area. Sources of information consulted to develop this assessment of existing conditions included published literature, the Southwest Regional Gap Analysis (Lowry et al. 2007), State of Utah- and Uintah County-listed noxious weeds obtained from the Utah Department of Agriculture and Food (UDAF) (UDAF 2012), consultations with agency personnel, and field observations made in fall 2011.

Upland Vegetation Communities

Steinaker Reservoir is located on the Colorado Plateau within the Uinta Basin Floor ecoregion. It is near the boundary of both the Uinta Basin Slopes, and Semi-Arid Benchlands and Canyonlands ecoregions (Bailey et al. 1994). Ecoregion determination is based on geology, vegetation, climate, hydrology, land use, and other ecological and cultural factors (CECWG 1997). The Uinta Basin Floor is a large basin surrounded by the Uinta Mountains and the Tavaputs Plateau. It includes the Uinta Basin valley floor as well as the associated gentle sloping terraces. Due to its topographic location, winters are cold, foggy, and prone to temperature inversion. Precipitation in this ecoregion is low and soils are arid. The Uinta Basin is supplied with abundant stream runoff from the surrounding mountains, though much of the runoff is captured for irrigation. Land that is not irrigated is often used for livestock grazing, which also alters plant communities from native conditions (Woods et al. 2001). For the Study Area, vegetation was characterized using the Southwest Regional Gap Analysis vegetation classifications (Lowry et al. 2007) as a starting point.

Bedrock Canyon and Tableland Approximately 50 acres of ridgelines and slopes along the northwest portion of the Study Area are classified as bedrock canyon and tableland. This classification corresponds to the Colorado Plateau Mixed Bedrock Canyon and Tableland class in the Gap Analysis (Lowry et al. 2007). Exposed rock dominates the landscape in this class, with scattered trees, shrubs and a sparse herbaceous layer accounting for less than 10 percent cover. Plant species may include pinyon pine (*Pinus edulis*), ponderosa pine (*Pinus ponderosa*), juniper (*Juniperus* spp.), mountain mahogany (*Cercocarpus intricatus*), white fire (*Abies concolor*), fourwing saltbush (*Atriplex canescens*), and Mormon tea (*Ephedra viridis*).

Pinyon-Juniper Shrubland Pinyon-Juniper Shrubland is the largest and most dispersed vegetation class in the Study Area, accounting for approximately 590 acres. This community corresponds to Colorado Plateau Pinyon-Juniper Shrubland ecological system (Lowry et al. 2007), which occupies mesatops, foothills, and slopes at elevations ranging from about 4,000 to 6,500 feet. Soils are generally rocky and shallow or shaly. Species which may be found here could include pinyon pine, Utah juniper (*Juniperus osteosperma*), black sagebrush (*Artemisia nova*), Wyoming big sagebrush (*Artemisia tridentata* spp. *wyomingensis*), yellow rabbitbrush (*Chrysothamnus viscidiflorus*), and blackbrush (*Coleogyne ramosissima*).

Sagebrush Shrubland Sagebrush Shrublands occupy about 147 acres along the western Study Area boundary. This class corresponds to the Inter-Mountain Basins Big Sagebrush Shrubland ecoregion, which is widespread across the western United States and occupies lowland elevations (4,900–7,500 feet) in broad basins, valleys, and foothills between mountain ranges

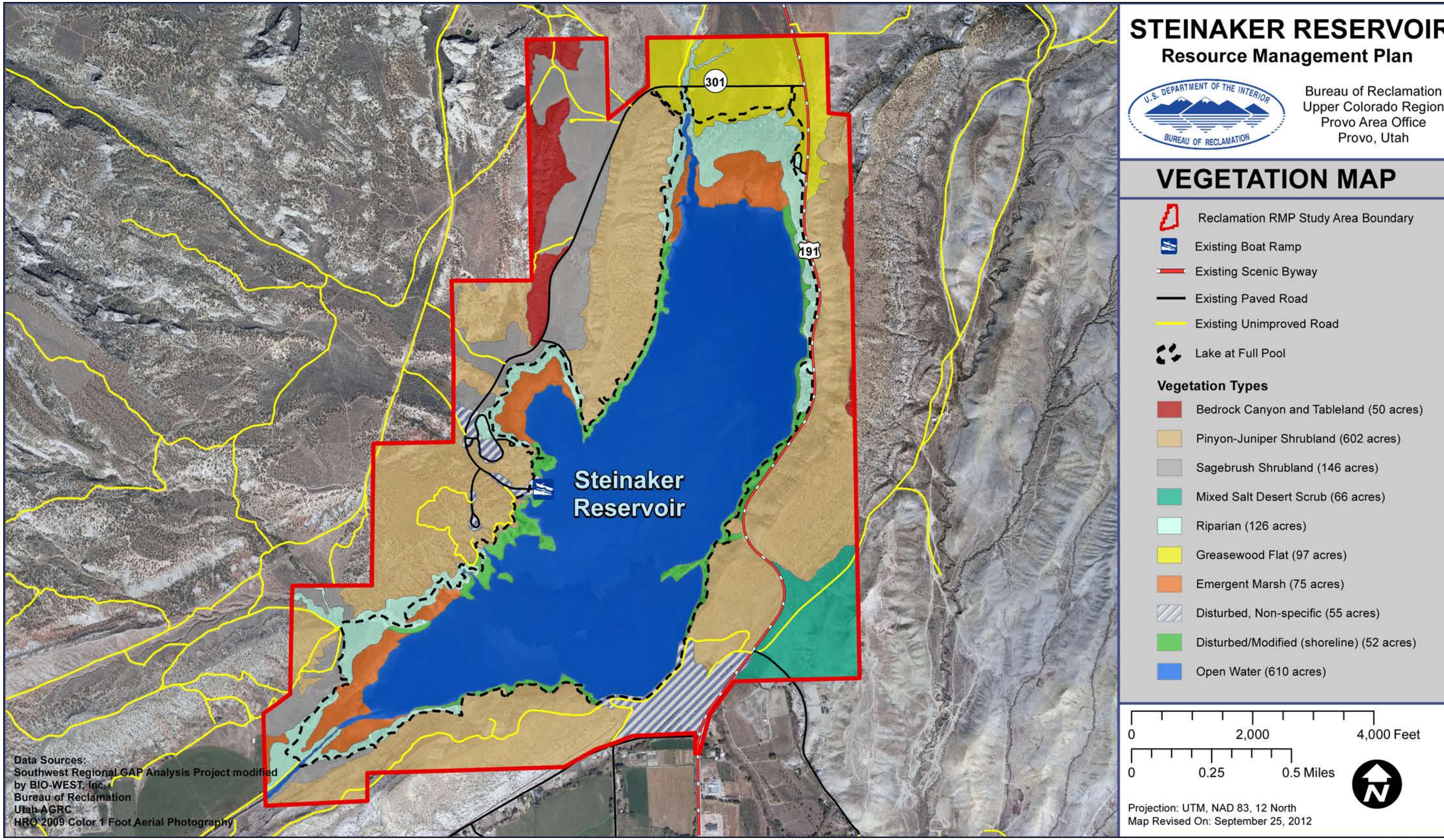

Figure 3-14. Steinaker Reservoir Resource Management Plan (RMP) Study Area Vegetation Map.

(Lowry et al. 2007). Dominant species may include Wyoming big sagebrush or basin big sagebrush (*Artemisia tridentata* spp. *tridentata*) with scattered juniper species or pinyon pine. The most common associated shrub species that may be found are greasewood (*Sarcobatus vermiculatus*), saltbush (*Atriplex* spp.), rubber rabbitbrush (*Ericameria nauseosa*), yellow rabbitbrush, and bitterbrush (*Purshia tridentata*). In previously burned areas, mountain snowberry (*Symphoricarpos oreophilus*) may be co-dominant. The herbaceous layer has less than 25 percent coverage and common species are Indian ricegrass (*Achnatherum hymenoides*), blue grama (*Bouteloua gracilis*), thickspike wheatgrass (*Elymus lanceolatus*), Idaho fescue (*Festuca idahoensis*), needle and thread (*Hesperostipa comata*), western wheatgrass (*Pascopyrum smithii*), and Sandberg bluegrass (*Poa secunda*). Invasive cheatgrass (*Bromus tectorum*) or other nonnative species could also be present and may dominate the herbaceous layer.

Mixed Salt Desert Scrub The southeast corner of the Study Area includes about 66 acres of Mixed Salt Desert Scrub. This class corresponds to the Inter-Mountain Basins Mixed Salt Desert Scrub, an ecological system that extends across the U.S. intermountain west (Lowry et al. 2007). This system is typically dominated by one or more *Atriplex* species such as shadscale (*Atriplex confertifolia*), fourwing saltbush, allscale (*A. polycarpa*), and spiny saltbush (*A. spinifera*). Other species may be yellow rabbitbrush, rubber rabbitbrush, Nevada jointfir (*Ephedra nevadensis*), boxthorn (*Lycium* spp.,) and horsebrush (*Tetradymia* spp.). The herbaceous layer might include: Indian ricegrass, blue grama, thickspike wheatgrass, western wheatgrass, James' galleta (*Pleuraphis jamesii*), Sandberg bluegrass, and alkali sacaton (*Sporobolus airoides*).

Riparian-Wetland Vegetation Communities

Riparian-wetland communities provide important ecological and resource management functions, including conveyance and storage of floodwaters, erosion prevention, wildlife habitat, recreation, water supply and quality maintenance, archeological value, educational value, and aesthetic value (Dennison and Schmid 1997). Riparian zones can be defined as strips of vegetation adjacent to streams, rivers, lakes, reservoirs, and other inland aquatic systems that affect or are affected by the presence of water (Fischer et al. 2000). Wetlands can be defined as lands transitional between terrestrial and aquatic systems, where the water table is usually at or near the soil surface or the land is covered by shallow water (Cowardin et al. 1979). Depending on the level of flooding and soil saturation, riparian-wetland communities within the Study Area may be legally protected under the Clean Water Act of 1972 and the Utah Stream Alteration Rule of 1973 (CWA 1972/UT 1973). Thus, the identification and classification of these communities is important both for resource management reasons and legal reasons; consequently, riparian-wetland communities were identified in the recreation development suitability analysis, summarized in Chapter 2.

The riparian-wetlands classification within the Study Area includes several types of ecosystems that are associated with flooding and/or soil saturation of varying durations. Riparian-wetlands within the Study Area were classified into groups according to the International Terrestrial Ecological Systems Classification, and mapping data was downloaded from the Southwest Regional Gap Analysis Project. The riparian-wetland classes identified include three types of communities, which are mapped in Figure 3-14.

Riparian Approximately 126 acres of riparian communities are found surrounding the margins of the emergent marsh communities. Riparian communities are dependent on annual flooding of riverine and lacustrine systems. They can be found occupying floodplains, sand and cobble bars, islands, and irrigation ditches. Study Area riparian communities correspond to the Rocky Mountain Lower Montane Riparian Woodland and Shrubland ecological system, which is found throughout the Colorado Plateau and Rocky Mountain regions at elevations of about 3,000–9,200 feet (Lowry et al. 2007). This system represents an assemblage of tree communities with varying dominant tree species and a highly diverse shrub component. Common tree species include box elder (*Acer negundo*), eastern cottonwood (*Populus deltoides*), narrowleaf cottonwood (*Populus angustifolia*), Fremont cottonwood (*Populus fremontii*), Douglas fir (*Pseudotsuga menziesii*), and blue spruce (*Picea pungens*). Shrub species include redosier dogwood (*Cornus sericea*), chokecherry (*Prunus virginiana*), skunkbush sumac (*Rhus trilobata*), willow (*Salix* spp.), silver buffaloberry (*Shepherdia argentea*), snowberry (*Symphoricarpos* spp.), and river hawthorn (*Crataegus rivularis*). Russian olive (*Elaeagnus angustifolia*) and saltcedar (*Tamarix* spp.) are also common invasive species found in riparian communities and have been observed in the Study Area.

Greasewood Flat A subclass of the riparian community is the greasewood flat community found on the north end of the Study Area, near the State Park entrance. Approximately 97 acres of the Study Area are characterized as greasewood flat. Such communities are often found in areas that transition from wetland to upland and contain a mixture of plants found within both wetland and upland communities. The Study Area community corresponds to the Inter-Mountain Basins Greasewood Flat ecological system, which is found in the Inter-Mountain basin region of the western United States and is associated with drainages and stream terraces (Lowry et al. 2007). Species co-dominant with greasewood could include fourwing saltbush, shadscale, Gardner's saltbush (*Atriplex gardneri*), Wyoming big sagebrush, basin big sagebrush, silver sagebrush (*Artemisia cana*), and winterfat (*Krascheninnikovia lanata*). An herbaceous layer could include alkali sakaton, western wheatgrass, saltgrass, Sandberg bluegrass, and Nuttall's alkaligrass (*Puccinellia nuttalliana*).

Emergent Marsh Emergent marsh communities are found on the northern and southern tips of Steinaker Reservoir and surrounding the bay where State Park facilities are located. Approximately 75 acres of the Study Area are characterized as emergent marsh. Dominant vegetation is herbaceous and adapted to frequent or continual inundation. North American Arid West Emergent Marshes are found in association with landscape depressions, lake edges, and stream and river banks (Lowry et al. 2007). Specific species vary greatly throughout the arid west, but common genera include bulrush (*Schoenoplectus*), cattail (*Typha*), rush (*Juncus*), pondweed (*Potamogeton*), smartweed (*Polygonum*), and canary grass (*Phalaris*). Rooted vegetation can exist in up to 6.5 feet of open water. Vegetation may also include floating or partially to fully submerged species.

Disturbed Non-specific and Disturbed/Modified Vegetation Communities

Two classifications were used for Study Area lands that have been disturbed to the point that they are barren or exhibit relatively little vegetative cover. In other areas of the region, the Disturbed Non-specific class is often associated with heavy grazing activity (Lowry et al. 2007). For the Study Area, the Disturbed Non-specific class was used for Steinaker Dam and portions of the State Park facilities area (55 acres total). A Disturbed/Modified classification was used for

Steinaker Reservoir shorelines affected by fluctuating water levels and for the beach areas, where native cover has been replaced with sand that has been imported from outside the Study Area (52 acres total).

Noxious Weeds

Table 3-9 shows plant species listed by the State of Utah and Uintah County as noxious weeds, as reported by UDAF (UDAF 2012). Portions of the Study Area that are most vulnerable to infestation by noxious weeds include roadsides, camping areas, fishing access areas, and the reservoir shoreline. Noxious weeds frequently infest roadsides because vehicles help disperse seeds over large geographical areas. All-terrain vehicle travel, fishing and hunting access, and other recreational activities may also promote the spread of noxious species by disturbing existing vegetation and by helping to disperse seeds. Persons walking through riparian areas can spread species including (but not limited to) poison hemlock (*Conium* spp.), teasle (*Dipsacus* spp.), Canada thistle (*Cirsium arvense*), hoary cress, and perennial pepperweed. Dogs may spread species such as houndstongue, teasle, and thistle by carrying seeds in their fur. Fluctuating water levels along shorelines are vulnerable to saltcedar and Russian olive infestation.

Wildlife

Wildlife of interest to state and federal agencies and the general public in the Study Area include special-status species (federal and state threatened and endangered species and other species of concern), big game, raptors, and waterfowl. Reclamation lands provide opportunities for wildlife viewing and waterfowl hunting.

Habitat Characteristics

Figure 3-15 illustrates habitat areas that have been defined by UDWR for particular species. Lands immediately surrounding Steinaker Reservoir are designated as mule deer (*Odocoileus hemionus*) winter habitat, while portions of the Study Area are continuous with both mule deer and elk (*Cervus canadensis*) winter habitat. Outside the Study Area, lands south of Steinaker Reservoir are designated as mule deer year-long habitat. To the east of the Study Area there are also lands designated as greater sage-grouse (*Centrocercus urophasianus*) brood and occupied habitat. In 2013, the State of Utah completed a conservation plan for greater sage-grouse (UDWR 2013). The plan includes measurable objectives to maintain habitat acreage and spatial distribution of the species and to increase the population size. However, none of the lands within the Study Area have been identified as greater sage-grouse habitat.

A component of the Utah Comprehensive Wildlife Conservation Strategy (CWCS) is to prioritize habitat types within the state for species of greatest conservation need (Sutter et al. 2005). Five criteria are used to score habitats: abundance, threats, trends, sensitive species occurrence, and vertebrate biodiversity. Habitat types are evaluated and assigned a value from 1 to 5 in all of the five categories, with potential total scores ranging from 5 to 25, 5 being the lowest possible priority and 25 being the highest possible priority. Habitat types with high scores are considered to be high priority and most in need of conservation. The CWCS scoring system was used as a guideline for assessing habitat preservation priorities for Study Area vegetation communities. Table 3-10 summarizes Study Area vegetation communities and CWCS scoring of habitats.

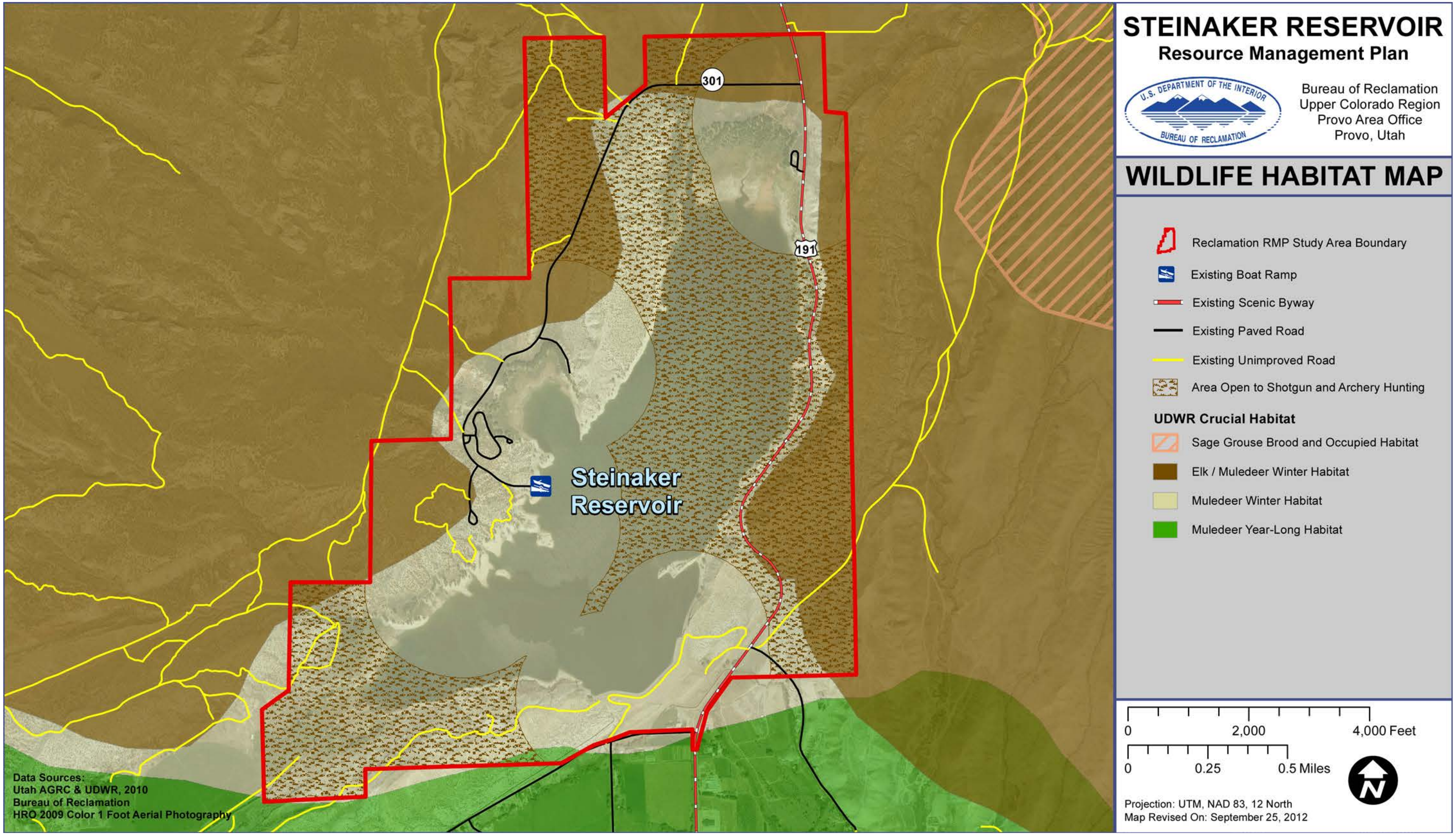

Figure 3-15. Steinaker Reservoir Resource Management Plan (RMP) Study Area Wildlife Habitat Map.

Table 3-9. State of Utah and Uintah County Noxious Weed List.

COMMON NAME	SCIENTIFIC NAME
black henbane	*Hyoscyamus niger*
diffuse knapweed	*Centaurea diffusa*
Johnsongrass	*Sorghum halepense*
leafy spurge	*Euphorbia esula*
Medusahead	*Taeniatherum caput-medusae*
oxeye daisy	*Leucanthemum vulgare*
purple loosestrife	*Lythrum salicaria*
St. Johnswort	*Hypericum perforatum*
spotted knapweed	*Centaurea stoebe*
sulfur cinquefoil	*Potentilla recta*
yellow starthistle	*Centaurea solstitialis*
yellow toadflax	*Linaria vulgaris*
Bermudagrass	*Cynodon dactylon*
Dalmatian toadflax	*Linaria dalmatica*
dyer's woad	*Isatis tinctoria*
hoary cress	*Cardaria draba*
musk thistle	*Carduus nutans*
perennial pepperweed	*Lepidium latifolium*
poison hemlock	*Conium maculatum*
Russian knapweed	*Centaurea repens*
squarrose knapweed	*Centaurea virgata*
Scotch thistle	*Onopordum acanthium*
Canada thistle	*Cirsium arvense*
field bindweed	*Convolvulus arvensis*
houndstongue	*Cynoglossum officinale*
quackgrass	*Elymus repens*
saltcedar	*Tamarix* spp.
common teasel [a]	*Dipsacus fullonum*
puncturevine [a]	*Tribulus terrestris*
Russian olive [a]	*Elaeagnus angustifolia*

Source: UDAF (2012).
[a] Uintah County noxious weeds.

Table 3-10. Status Review of Study Area Habitat Types Using the Utah Comprehensive Wildlife Conservation Strategy (CWCS) Scoring System.

STUDY AREA VEGETATION COMMUNITY	COMPARABLE CWCS [a] HABITATS	OVERALL CWCS SCORE
Bedrock Canyon and Tableland	Rock	11.7
Pinyon-Juniper Woodland	Pinyon-Juniper	12.6
Sagebrush Shrubland	High Desert Scrub	14.8
Mixed Salt Desert Scrub	High Desert Scrub	14.8
Greasewood Flat	High Desert Scrub	14.8
Emergent Marsh	Wetland	20.7
Riparian	Lowland Riparian/Mountain Riparian	23.8/20.5
Bedrock Canyon and Tableland	Rock	11.7

[a] Utah Comprehensive Wildlife Conservation Strategy (Sutter et al. 2005).

The majority of the wildlife habitat in the Study Area consists of upland plant communities (e.g., woodlands shrublands, grass, and other shrub-scrub communities). Statewide, these communities rank in the middle of the CWCS prioritization scale. Within the Study Area, these upland vegetation types are fragmented by roads and recreational facilities. Nevertheless, they are important to a wide range of wildlife including rodents, big game, lizards, snakes, upland game birds, raptors, and songbirds.

The highest priority CWCS habitats found in the Study Area are the emergent marsh and riparian habitats. Riparian-wetland vegetation types are located along the shorelines and within tributary inflow areas of Steinaker Reservoir. Despite a limited amount of riparian-wetland vegetation types and their fragmented nature, these habitats add substantially to the biological diversity of the Study Area by attracting a diverse assemblage of wildlife species that otherwise would not occur. Riparian-wetland habitats are considered a limited resource in the surrounding arid environment and are valuable to species of waterfowl, shorebirds, passerines, and amphibians. In general, factors that negatively influence wildlife habitat condition in the Study Area are disturbance from recreation use, introduction of invasive plants and animals, and reservoir water management. Recreational use may cause disturbance to and displacement of wildlife, and can degrade habitat conditions. Disturbance associated with campers, boats, and vehicular traffic often increases stress to some wildlife that are intolerant of human presence, such as nesting birds. Depending on the level of disturbance, some species may be displaced from the Study Area to adjacent habitats. Recreational use of undeveloped areas can also cause trampling and subsequent fragmentation of habitat, depending on the level and frequency of disturbance. An example at Steinaker Reservoir is OHV riding in undesignated areas near Steinaker Feeder Canal inflow. This undesired recreational use has recently been managed by State Parks with installation of a pipe fence along the Reclamation property boundary in this vicinity.

Fluctuating reservoir water levels alter wildlife use in a number of ways. For instance, when water levels are low, species that prefer mudflats and shallow water, such as shorebirds, benefit by having available habitat and prey. Conversely, low water levels can create exaggerated separations of riparian-wetland habitats from open water, negatively affecting habitat quality for other species. When water levels are raised during the breeding season, nesting and roosting sites may become flooded. Fish spawning areas, which are where many birds feed, also vary with the changing water levels. Shore scouring prevents vegetation from becoming established and can facilitate establishment of invasive plants such as saltcedar. These factors can reduce the overall amount of available habitat for some species.

Birds

Migratory birds found within the Study Area are protected under the Migratory Bird Treaty Act of 1918 (MBTA) and Executive Order 131866 (January 17, 2001), "Responsibilities of Federal agencies to Protect Migratory Birds." This order directs federal agencies to take certain actions to further implement the MBTA and the Bald and Golden Eagle Protection Act (1940) as well as other pertinent statutes. The entire Study Area can be considered migratory bird habitat. Waterfowl hunting is allowed within the Study Area according to current UDWR waterfowl hunting guidebook regulations (see Figure 3-15).

Steinaker Reservoir receives a great deal of bird use during all seasons of the year because of the presence of a complex of open water, riparian-wetland, and upland habitats. This complex provides resources required by shorebirds and waterfowl such as food items (e.g., fish, macroinvertebrates, and emergent vegetation), sites to loaf and rest, protective cover, nest material, and secluded nesting areas. Such resources are directly associated with riparian-wetland vegetation types that are larger than 1.0 acre in size and are generally located in inflow areas in the northern and southern ends of Steinaker Reservoir and in the middle of the western shoreline. The quality of the habitat for waterfowl and shorebirds is influenced by the high degree of disturbance resulting from recreational use and fluctuating water levels.

Water birds potentially found within the Study Area include common loon (*Gavia immer*), pied-billed grebe (*Podilymbus podiceps*), eared grebe (*Podiceps caspicus*), western grebe (*Aechmophorus occidentalis*), Clark's grebe (*Aechmophorus clarkii*), American white pelican (*Pelecanus erythrorhynchos*), double-crested cormorant (*Phalacrocorax auritus*), great blue heron (*Ardea herodias*), Canada goose (*Branta canadensis*), gadwall (*Anas strepera*), American wigeon (*Anas americana*), mallard (*Anas platyrhynchos*), northern pintail (*Anas acuta*), cinnamon teal (*Anas cyanoptera*), green-winged teal (*Anas carolinensis*), redhead (*Aythya americana*), ring-necked duck (*Aythya collaris*), lesser scaup (*Aythya affinis*), northern shoveler (*Spatula clypeata*), common merganser (*Mergus merganser*), ruddy duck (*Oxyura jamaicensis*), American coot (*Fulica americana*), killdeer (*Charadrius vociferous*), spotted sandpiper (*Actitis macularius*), greater yellowlegs (*Tringa melanoleuca*), willet (*Tringa semipalmata*), Franklin's gull (*Larus pipixcan*), ring-billed gull (*Larus delawarensis*), California gull (*Larus californicus*), and Forster's tern (*Sterna forsteri*).

Raptors, such as red-tailed hawk (*Buteo jamaicensis*), great-horned owl (*Bubo virginianus*), barn owl (*Tyto alba*), and American kestrel (*Falco sparverius*), likely occur throughout the Study Area, particularly in the cottonwood (*Populus* sp.) along Ashley Creek and around the edges of Steinaker Reservoir. The upland areas provide an abundance of small mammal prey, such as deer mouse (*Peromyscus maniculatus*) and gopher (*Thomomys* spp.). Osprey (*Pandion haliaetus*) nest near Steinaker Dam. Bald eagle (*Haliaeetus leucocephalus*) commonly winter on the reservoir. Golden eagle (*Aquila chrysaetos*) have been documented nesting within the Study Area along the cliffs east of the Steinaker Reservoir (Maxfield 2012). Both eagle species are given special protection under the Bald and Golden Eagle Protection Act, which prohibits the take of birds, their parts, nests, or eggs without a permit.

Habitat for most songbirds, such as yellow warbler (*Dendroica petechia*), yellow-rumped warbler (*Dendroica coronata*), black-capped chickadee (*Poecile atricapillus*), orange-crowned warbler (*Vermivora celata*), ruby-crowned kinglet (*Regulus calendula*), mountain bluebird (*Sialia currucoides*), white-crowned sparrow (*Zonotrichia leucophrys*), chipping sparrow (*Spizella passerina*), and song sparrow (*Melospiza melodia*), is associated with riparian-wetland areas with their dense growth and complex vertical structure. The large cottonwoods in these areas are particularly important features. These areas support nesting, migrating, and wintering populations of songbirds and provide nesting sites, protective cover from weather and predators, and forage items (e.g., seeds, plant material, and insects). Other birds associated with this habitat include western kingbird (*Tyrannus verticalus*), red-winged blackbird (*Agelaius phoeniceus*), and yellow-headed blackbird (*Xanthocephalus xanthocephalus*).

Other species of birds using the Study Area include mourning dove (*Zenaida macroura*), northern flicker (*Colaptes auratus*), Steller's jay (*Cyanocitta stelleri*), black-billed magpie (*Pica hudsonia*), common raven (*Corvus corax*), American crow (*Corvus brachyrhynchos*), tree swallow (*Tachycineta bicolor*), violet-green swallow (*Tachycineta thalassina*), northern rough-winged swallow (*Stelgidopteryx serripennis*), cliff swallow (*Hirundo pyrrhonota*), wild turkey (*Meleagris gallopavo*), and common nighthawk (*Chordeiles minor*).

The Study Area also includes UDWR-delineated habitat for the California quail (*Callipepla californica*). This species is not hunted within the Study Area, so areas around Steinaker Reservoir may provide important refuge for California quail, if it is present.

Mammals

The Study Area provides habitat for a number of mammal species, including big game, small mammals, bats and others. The Pinyon-Juniper Shrubland and the Sagebrush Shrubland habitats serve as both summer and wintering areas for mule deer and winter habitat for elk. Moose (*Alces alces*) may use stream drainages associated with the Steinaker Reservoir, and predators such as black bear (*Ursus americanus*), mountain lion (*Felis concolor*), and coyote (*Canis latrans*) are also found in the area. Big game hunting is not allowed within the Study Area, which may provide important refuge for these species during the hunting season.

Other mammals potentially found within the Study Area include: dwarf shrew (*Sorex nanus*), Merriam's shrew (*Sorex merriami*), mountain cottontail (*Sylvilagus nuttalli*), white-tailed jackrabbit (*Lepus townsendii*), beaver (*Castor canadensis*), porcupine (*Erethizon dorsatum*), northern pocket gopher (*Thomomys talpoides*), Ord's kangaroo rat (*Dipodomys ordii*), brush mouse (*Peromyscus boylii*), canyon mouse (*Peromyscus crinitus*), deer mouse, pinyon mouse (*Peromyscus truei*), long-tailed vole (*Microtus longicaudus*), muskrat (*Ondatra zibethicus*), cliff chipmunk (*Neotamias dorsalis*), Hopi chipmunk (*Neotamias rufus*), least chipmunk (*Neotamias minimus*), Uinta chipmunk (*Neotamias umbrinus*), yellow-bellied marmot (*Marmota flaviventris*), red fox (*Vulpes vulpes*), ringtail (*Bassariscus astutus*), raccoon (*Procyon lotor*), American mink (*Mustela vison*), badger (*Taxidea taxus*), long-tailed weasel (*Mustela frenata*), northern river otter (*Lontra canadensis*), and bobcat (*Lynx rufus*).

The Study Area may support a number of bat species, such as big brown bat (*Eptesicus fuscus*), little brown myotis (*Myotis lucifugus*), and long-eared myotis (*Myotis evotis*), because of the availability of a stable insect prey source associated with the reservoir and the riparian-wetland habitats.

Herpetofauna

Suitable habitat for amphibians at Steinaker Reservoir includes the riparian-wetland habitats and the reservoir. Species potentially occurring in the area include boreal chorus frog (*Pseudacris maculata*), tiger salamander (*Ambystoma tigrinum*), and northern leopard frog (*Lithobates pipiens*). In addition, it is likely that some species that are tolerant of arid conditions, such as the Great Basin spadefoot (*Spea intermontana*) also thrive within the Study Area. Reptile species that potentially occur throughout the Study Area in the upland and riparian-wetland habitats include common sagebrush lizard (*Sceloporus graciosus*), eastern fence lizard (*Sceloporus undulates*), greater short-horned lizard (*Phrynosoma hernandesi*), Great Basin gophersnake (*Pituophis catenifer deserticola*), eastern racer (*Coluber constrictor*), midget faded rattlesnake (*Crotalus concolor*), milksnake (*Lampropeltis triangulum*), striped whipsnake (*Masticophis taeniatus*), and prairie rattlesnake (*Crotalus viridis*), Several species of garter snakes (*Thamnophis* spp.) are also likely present.

Fisheries

In terms of fish habitat, the shoreline habitat of Steinaker Reservoir has intermixed vegetated and nonvegetated slopes, in addition to a few areas that have been stabilized with riprap (e.g., the dam). Much of the topography presents steep sloping shorelines and cliffs. Much of the habitat, in the form of fish cover, is represented by boulders or large cobble submerged along the shoreline. Inundated and emergent vegetation is present in the shallow coves and inflow areas. The largest area of submerged vegetation occurs in a large, shallow cove along the western shore. Shallow, marsh-like habitat is also present near the inflow canal from Ashley Creek at the southwest end of Steinaker Reservoir and the wash at the north end. Low-water years could produce limited cover for all life stages of fish because there is little shoreline vegetation present.

Although standard water quality parameters don't seem to indicate any impairment to the aquatic biota (UDWR 2011a) the UDEQ has issued a mercury fish consumption advisory on Steinaker Reservoir as of August 2011 (UDEQ 2011). This finding advises that pregnant women and children do not eat largemouth bass (*Micropterus salmoides*), and that adults limit their consumption to two 8-ounce servings per month (UDEQ 2011). Although mercury is a naturally occurring element, it can transform into toxic methyl mercury. Chronic exposure in low concentrations can lead to neurological effects in developing fetuses and children. Although mercury may be found in low concentrations in Steinaker Reservoir, it bioaccumulates and biomagnifies through the food web. Therefore, secondary consumers contain higher concentrations, and sometimes toxic concentrations, than that found in the water column (Morel et al. 1998). There are no health risks associated with other uses of Steinaker Reservoir including swimming (UDEQ 2011).

With the presence of selenium throughout the Ashley Creek drainage there is also potential for elevated selenium levels to occur in Steinaker Reservoir. Selenium accumulated in fish tissue could result in consumption advisories for harvested fish. Selenium has also shown to cause malformations in fish that may hinder their reproductive capacity (Lemly 1998).

Fish Species

The Statewide Aquatic Habitat Classification System is used to rate stream sections and bodies of water according to aesthetics, availability, and productivity. Ratings for these categories are then totaled, weighed, and given a numerical rating from 1 to 6. Ashley Creek off-channel of Steinaker Reservoir above the diversion canal has been classified as a Class 3 body of water (Crosby and Bartlett 2005). A brief description of each class is as follows.

- **Class 1** waters are top-quality fishing that should be preserved and improved for angling and recreational use. These areas are accessible by vehicle, with blue ribbon trout fishing and excellent productivity that supports large fish populations of one or more species of sportfish.

- **Class 2** waters also provide excellent fishing but are lacking in one category. Many of these waters are comparable to Class 1 waters, except are smaller in size. Water fluctuations may differentiate these waters from Class 1 streams.

- **Class 3** waters are very important because they comprise about half of the total stream fishery habitat and support the majority of recreational fishing in Utah.

- **Class 4** waters are usually poor in quality with limited fishery habitat. These waters are usually small and have poor scenic value with a short growing season. Drawdown or dewatering may occur. Stocking of catchable sized fish are required to maintain the fishery.

- **Class 5** waters are of little value to the sport fishery due to the degradation of the natural environment from human development. A long-term sport fishery cannot be established by natural or artificial means.

- **Class 6** waters are those streams that are dewatered for a significant period each year.

Sport species in Utah water bodies are given a management classification in addition to the aquatic habitat classification. The management classifications denotes how a species or group of species is managed relative to fishing pressure, fish production of the system, and presence of wild fish, species of special concern, or trophy fishery conditions. The stream section of Ashley Creek above the Steinaker Feeder Canal to Steinaker Reservoir is managed as a wild-fish water, in which fish species and habitat dictate what can naturally be produced and sustained. Fish within these waters reproduce naturally, and fishing opportunities are sustained rather than managed. Steinaker Reservoir is managed with a Basic Yield classification for rainbow trout (*Oncorhynchus mykiss*) and largemouth bass. Basic Yield Waters are those that provide fishing opportunities in areas where angling pressure is extensive or where habitat is marginal for fishery success (Crosby and Bartlett 2005).

Steinaker Reservoir is managed primarily as a blue ribbon largemouth bass and rainbow trout fishery. The rainbow trout fishery is put-and-take. Brown trout (*Salmo trutta*) are present and thought to either come downstream via the Steinaker Feeder Canal from Ashley Creek and/or naturally recruit in the lake (T. Hedrick 2011, pers. comm.). Smallmouth bass (*Micropterus dolomieu*) and sunfish (*Lepomis* spp.) have been illegally stocked. Steinaker Reservoir is managed as a two-story fishery, with both coldwater and warmwater fish species. Non-sportfish species include common carp (*Cyprinus carpio*), Utah chub (*Gila atraria*), and redside shiner (*Richardsonius balteatus*) that reproduce in Steinaker Reservoir (Reclamation 2007).

Fish assemblages for Steinaker Reservoir have varied historically but currently include ten species of fish representing three families (Table 3-11). Coldwater sportfish species that inhabit Steinaker Reservoir consist of rainbow trout, brown trout, and albino rainbow trout while warmwater sportfish species of largemouth bass, smallmouth bass, green sunfish (*Lepomis cyanellus*), and bluegill (*Lepomis macrochirus*). Specific bag and possession limits do exist for sport fish at Steinaker Reservoir; however, length limits are not imposed (Table 3-12).

Table 3-11. Fish Species Occurring in Steinaker Reservoir.

COMMON NAME (*SCIENTIFIC NAME*)	STATUS
Family Salmonidae—Trout	
brown trout (*Salmo trutta*)	Introduced
rainbow trout (*Oncorhynchus mykiss*)	Introduced
albino rainbow trout (*Oncorhynchus mykiss*)	Introduced
Family Cyprinidae—Minnows	
common carp (*Cyprinus carpio*)	Introduced
Utah chub (*Gila atraria*)	Native
Redside shiner (*Richardsonius balteatus*)	Native
Family Centrarchidae—Sunfishes	
bluegill (*Lepomis macrochirus*)	Introduced
largemouth bass (*Micropterus salmoides*)	Introduced
green sunfish (*Lepomis cyanellus*)	Introduced
smallmouth bass (*Micropterus dolomieu*)	Introduced

Source: T. Hedrick 2011, pers. comm.

Table 3-12. Daily Bag and Size Limits for Sportfish in Steinaker Reservoir.

SPECIES	LIMIT
bluegill and green sunfish	50 in aggregate
largemouth bass and smallmouth bass	6 in aggregate
trout in aggregate	4

Source: UDWR (2011b).

Table 3-13 summarizes UDWR stocking records from 2002 to 2011. Steinaker Reservoir is stocked annually with rainbow trout and managed as a put-and-take trout fishery. Stockings occur in spring or fall and have varied from approximately 8,000 to more than 39,000 fish per year since 2002. Not shown in the table, Steinaker Reservoir was also stocked with 50,000 largemouth bass fry in 1990 (UDWR 2011a).

Experimental gill netting in 2010 and 2011 showed highest catch rates for trout and largemouth bass, although relatively few individuals were captured either year. Green sunfish and bluegill were also captured during sampling events for both years (Johnson 2010a, 2010b).

Table 3-13. Rainbow and Albino Rainbow Trout Stocking Records for 2002–2011 in Steinaker Reservoir.

YEAR	NUMBER STOCKED	SIZE (inches)
2002	no stocking record	-
2003	27,396	8–9
2004	31,147	8–9
2005	39,841	8
2006	8,000	8
2007	29,999	8-9
2008	35,069	8–10
2009	26,386	7–13
2010	30,637	8 and 14
2011	37,742	8–10

Source: UDWR (2011a).

Aquatic Nuisance and Invasive Species

Aquatic nuisance and invasive species (AIS) are defined as water-associated, nonnative plant and animal species that threaten diversity or abundance of native species due to a variety of ecological factors. There are numerous AIS already occurring in Utah waters with others threatening immediate arrival. Steinaker Reservoir is among the Utah water bodies that are susceptible to AIS introductions (UDWR 2009).

Quagga Mussel No quagga mussel (*Dreissena bugensis*) or quagga mussel veligers have been detected in Steinaker Reservoir (T. Hedrick 2011, pers. comm.). Prevention of infestation is important for protecting water quality and maintaining a quality fishery. Invasive mussels are a threat throughout Utah and in other states because they can be transported in boats and equipment, reproduce rapidly, deplete nutrients in the water, and are costly to control (UDWR 2012a).

Pathogens Whirling disease is a condition caused by the parasite *Myxobolus cerebralis*. This pathogen has been detected in other Utah waters (UDWR 2009), but has not been detected in Steinaker Reservoir or Ashley Creek to date. While rainbow trout are very susceptible to this pathogen, the disease is mostly detrimental to smaller fish. It is unlikely that catchable-sized fish stocked in Steinaker Reservoir would show deformities should the pathogen occur.

Nonnative Fish Species The fishery at Steinaker Reservoir has been changing as a result of illegal introductions of smallmouth bass and sunfish (T. Hedrick 2011, pers. comm.). This has the potential to result in decreased catch rates, particularly for rainbow trout which were originally stocked for a put-and-take trout fishery. Although smallmouth bass and sunfish are considered sportfish throughout the state, they are nuisance species and invasive in nature.

American Bullfrog Presence of the American Bullfrog (*Rana catesbeiana*, also classified as *Lithobates catesbeianus*) at Steinaker Reservoir was confirmed in 2012 (T. Hedrick 2013, pers. comm.). Native to the eastern United States and Great Plains, the bullfrog is considered an aquatic invasive species in Utah because it competes with and preys on native species (UDWR 2009).

Threatened, Endangered, and Other Special-Status Species

This section provides an assessment of special status-species known to occur in Uintah County and the likelihood of occurrence in the Study Area. This includes consideration of state-listed, special status species as well as any federally listed endangered, threatened, or candidate species.

Plants

Study Area vegetation communities have the potential to support listed plant species of concern (state and federal) with known distributions in Uintah County. There are 19 rare plant species that potentially occur in the Study Area, including 1 endangered species, 3 threatened species, 1 candidate species, 1 species of concern, 1 proposed threatened species, and 13 state-listed rare plant species (Table 3-14). Potential occurrence of these species is based on the existence of appropriate, or seemly appropriate, habitat within the Study Area. Not all potential habitats will be appropriate for species presence. Due to specific habitat needs of each species, it is likely that only micro-habitats within the vegetation classifications will be appropriate for rare occurrence. Field surveys, prior to implementation of any new facilities, would be needed to determine presence or absence of these species; site-specific impacts are not addressed in this EA.

Table 3-14. Rare Plant Species with Potential to Occur at Steinaker Reservoir.

COMMON NAME	SCIENTIFIC NAME	GLOBAL RANK [a]	STATE RANK [b]	FEDERAL STATUS
park rockcress	*Arabis vivariensis*	G2[c]	S1	
horseshoe milkvetch	*Astragalus equisolensis*	G5	S1	
Hamilton's milkvetch	*Astragalus hamiltonii*	G1	S1	
Ownbey thistle	*Cirsium ownbeyi*	G3	S1	
Graham's cryptantha	*Cryptantha grahamii*	G3	S3	
giant helleborine	*Epipactis gigantea*	G3	S2S3	
Garrett bladderpod	*Lesquerella garrettii*	G2	S2	
white river penstemon	*Penstemon scariosus* var. *albifluvis*	G4	S1	Candidate
alcove bog-orchid	*Platanthera zothecina*	G2	S2	
shrubby reed-mustard	*Schoenocrambe suffrutescens*	G1	S1	Endangered
pariette cactus	*Sclerocactus brevispinus*	G1	S1	Threatened
Ute ladies tresses	*Spiranthes diluvialis*	G2	S1	Threatened
Uinta wirelettuce	*Stephanomeria tenuifolia* var. *uintaensis*	G5	S1	
sterile yucca	*Yucca sterilis*	G4G5	unknown	

Sources: UDWR (2012b).

[a] Global Ranking: G1-Critically Imperiled—At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors. G2-Imperiled—At high risk of extinction or elimination due to very restricted range, very few populations, steep declines, or other factors. G3- Vulnerable—At moderate risk of extinction or elimination due to a restricted range, relatively few populations, recent and widespread declines, or other factors. G4-Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors. G5-Secure—Common; widespread and abundant. GQ-Questionable taxonomy that may reduce conservation priority— Distinctiveness of this entity as a taxon or ecosystem type at the current level is questionable; resolution of this uncertainty may result in change from a species to a subspecies or hybrid, or inclusion of this taxon or type in another taxon or type, with the resulting taxon having a lower-priority (numerically higher) conservation status rank. The "Q" modifier is only used at a global level and not at a national or subnational level.

[b] State Ranking: S1-Critically Imperiled—Critically imperiled in the jurisdiction because of extreme rarity or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the jurisdiction. S2-Imperiled—Imperiled in the jurisdiction because of rarity due to very restricted range, very few populations, steep declines, or other factors making it very vulnerable to extirpation from jurisdiction. S3-Vulnerable—Vulnerable in the jurisdiction due to a restricted range, relatively few populations, recent and widespread declines, or other factors making it vulnerable to extirpation.

[c] G3 ranking for *Arabis vivariensis* is under consideration.

Many of the rare plant species have the potential to occur in more than one vegetation community type. Pinyon-Juniper Shrubland has the potential to support park rockcress (*Arabis vivariensis*), Hamilton's milkvetch (*Astragalus hamiltonii*), Ownbey thistle (*Cirsium ownbeyi*), Graham's cryptantha (*Cryptantha grahamii*), white river penstemon (*Penstemon scariosus* var. *albifluvis*), pariette cactus (*Sclerocactus brevispinus*), Uinta wirelettuce (*Stephanomeria tenuifolia* var. *uintaensis*), and sterile yucca (*Yucca sterilis*). Sagebrush Shrubland has the potential to support horseshoe milkvetch (*Astragalus equisolensis*), Ownbey thistle, Graham's cryptantha, Garrett bladderpod (*Lesquerella garrettii*), white river penstemon, shrubby reed-mustard (*Schoenocrambe suffrutescens*), and sterile yucca. Riparian areas have the potential to support giant helleborine (*Epipactis gigantea*), and Ute lady's tresses (*Spiranthes diluvialis*). There is a Ute lady's tresses occurrence reported by the Utah Natural Heritage Program along Ashley Creek outside of the Study Area (UDWR 2012b).

Wildlife and Fish

Species listed in Table 3-15 that are known or suspected to occur within or near the Study Area are discussed below. Although Canada lynx (*Lynx canadensis*) potentially occurs in the Study Area, suitable habitat (i.e., mature coniferous forests, cliff areas) is not present within the Study Area. The species may be present in the mountains to the west of the Study Area and could conceivably occur transiently at Steinaker Reservoir. Similarly, black-footed ferret (*Mustela nigripes*) is listed as an endangered species in Uintah County and is listed because its historical range include portions of Uinta County, and because there is a reintroduced colony in Coyote Basin on the east side of the Uinta County (UDWR 2012b). However, there is no suitable habitat or prey base for black-footed ferret within the Study Area.

Habitat for the western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) is characterized by dense lowland riparian areas with a dense sub-canopy of shrubs. These birds nest in elevations of 2,500–6,000 feet and typically require large, 100–200-acre tracts of contiguous riparian habitat for nesting (Hughes 1999). It is unlikely that the western yellow-billed cuckoo would nest within the Study Area. Occurrences would be temporary and infrequent because of a lack of suitable habitat and recreational use of the area by humans.

The UDWR does not have delineated habitat at Steinaker Reservoir for greater sage-grouse. However, it is possible the species could be found within the Study Area. These large game birds inhabit dry, upland areas such as foothills and mountain valleys. They are a sagebrush-obligate species and require sagebrush during most of their life cycle. Optimal habitat also includes an understory of grasses and forbs, and is usually associated with some wet meadow habitat (Schroeder et al. 1999). Although hunting greater sage-grouse is allowed in Utah, it is listed as sensitive by the State of Utah and as a candidate species by the federal government. The Study Area could potentially provide refuge for the species during hunting season, as well as habitat during the remainder of the year.

The federally listed fish species occurring in area of influence of the Steinaker Reservoir RMP project are bonytail (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), and razorback sucker (*Xyrauchen texanus* [Abbott]) (Reclamation 2007). These species are managed under the Upper Colorado River Endangered Fish Recovery Program (USFWS 1987). None of these endangered fish species are known to occur in Steinaker Reservoir (M. Breen 2011, pers. comm.; E. Johnson 2011, pers. comm.).

Table 3-15. State and Federally Listed Threatened, Endangered, or Sensitive Wildlife and Fish Species Occurring in Uintah County.

COMMON NAME	SCIENTIFIC NAME	STATUS a	POTENTIAL TO OCCUR IN THE STUDY AREA
	Birds		
American white pelican	*Pelecanus erythrorhynchos*	SPC	YES
bald eagle	*Haliaeetus leucocephalus*	SPC	YES
bobolink	*Dolichonyx oryzivorus*	SPC	NO
burrowing owl	*Athene cunicularia*	SPC	YES
ferruginous hawk	*Buteo regalis*	SPC	YES
greater sage-grouse	*Centrocercus urophasianus*	S-ESA	YES
Lewis's woodpecker	*Melanerpes lewis*	SPC	NO
long-billed curlew	*Numenius americanus*	SPC	NO
mountain plover	*Charadrius montanus*	SPC	NO
northern goshawk	*Accipiter gentilis*	CS	NO
Mexican spotted owl	*Strix occidentalis lucida*	S-ESA	NO
short-eared owl	*Asio flammeus*	SPC	NO
three-toed woodpecker	*Picoides tridactylus*	SPC	NO
yellow-billed cuckoo	*Coccyzus americanus*	S-ESA	NO
	Mammals		
big free-tailed bat	*Nyctinomops macrotis*	SPC	YES
black-footed ferret	*Mustela nigripes*	S-ESA	NO
brown (grizzly) bear	*Ursus arctos*	S-ESA	NO
Canada lynx	*Lynx canadensis*	S-ESA	NO
fringed myotis	*Myotis thysanodes*	SPC	NO
kit fox	*Vulpes macrotis*	SPC	NO
spotted bat	*Euderma maculatum*	SPC	YES
Townsend’s big-eared bat	*Corynorhinus townsendii*	SPC	POSSIBLE
white-tailed prairie-dog	*Cynomys leucurus*	SPC	YES
	Reptiles		
cornsnake	*Elaphe guttata*	SPC	NO
smooth greensnake	*Opheodrys vernalis*	SPC	NO
	Fish		
bluehead sucker	*Catostomus discobolus*	CS	NO
bonytail	*Gila elegans*	S-ESA	NO
Colorado pikeminnow	*Ptychocheilus lucius*	S-ESA	NO
Colorado River cutthroat trout	*Oncorhynchus clarkii pleuriticus*	CS	NO
flannelmouth sucker	*Catostomus latipinnis*	CS	YES
humpback chub	*Gila cypha*	S-ESA	NO
razorback sucker	*Xyrauchen texanus [Abbott]*	S-ESA	NO
roundtail chub	*Gila robusta*	CS	NO

Source: UDWR (2012b).
[a] S-ESA: federally-listed or candidate species under the Endangered Species Act; SPC: wildlife species of concern to the State of Utah; CS: species receiving special management under a conservation agreement in order to preclude the needs for federal listing.

The state-listed sensitive fish species likely to have historically occurred in the Ashley Creek drainage basin are flannelmouth sucker (*Catostomus latipinnis*), bluehead sucker (*Catostomus discobolus*), and roundtail chub (*Gila robusta*). Currently, bluehead and flannelmouth sucker can be found downstream of Steinaker Reservoir near the confluence of the Ashley Creek and Green River. Roundtail chub, which currently occur in the Green River, were likely found in the lower portion of Ashley Creek historically (Bosworth 2003, UDWR 2006). Currently, none of these sensitive fish species are found in Steinaker Reservoir (Crosby and Bartlett 2005, E. Johnson 2011, pers. comm.).

Cultural Resources

Cultural resources are defined as physical or other expressions of human activity or occupation. Such resources include culturally significant landscapes, prehistoric and historic archaeological sites as well as isolated artifacts or features, traditional cultural properties, Native American and other sacred places, and artifacts and documents of cultural and historic significance. Section 106 of the National Historic Preservation Act of 1966 (NHPA) mandates that Reclamation take into account the potential effects of a proposed federal undertaking on historic properties, such as a "Federal Action" in accordance with the National Environmental Policy Act (NEPA). Historic properties are defined as any prehistoric or historic district, site, building, structure or object included in, or eligible for, inclusion in the National Register of Historic Places (NRHP). Potential effects of the described alternatives on historic properties are the primary focus of this analysis.

The affected environment for cultural resources is identified as the area of potential effects (APE), in compliance with the regulations to Section 106 of the NHPA (36 CFR 800). The APE is defined as the geographic area within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties. The APE for the undertaking (proposed action) includes the entire Study Area.

Culture History Overview

The Study Area lies on the border between the Uinta Mountains, an east-west trending, 150-mile-long mountain range in northeastern Utah and the distinctly bowl-shaped region known as the Uinta Basin. Both the Uinta Mountains and Uinta Basin are sections of what geologist William Lee Stokes refers to as the Colorado Plateau physiographic province (1986). The general culture history of the Study Area described below is based on the broader cultural chronological sequence of the Uinta Basin.

Archaeological evidence of human occupation in the Uinta Basin extends as far back as about 11,000 years ago, the beginning of what is generally referred to as the PaleoIndian Period (ca 13,000 BP–6,000 BC). The PaleoIndian Period is characterized by human adaptation to terminal Pleistocene environments and the exploitation of various extinct and modern megafauna (Lower-Eskelson 2007). A deficiency in evidence of plant procurement as well as repeated or longer-term occupation suggests that PaleoIndian populations in the Uinta Basin were highly mobile. Although distinctive artifacts typically associated with the hunting of Pleistocene megafauna have been discovered in the Uinta Basin, there remains a lack of stratified sites exhibiting evidence of human occupation prior to about 6,000 BC. PaleoIndian projectile points from the Uinta Basin (i.e., Clovis, Folsom, Goshen, Agate Basin, Hell Gap, Eden-Scottsbluff, and Alberta-Cody), however, are identical to those from the northwestern plains region of the North

America, which have been recovered in chronometrically dated contexts from this period (Spangler 1995). As a result, even though a detailed account of the nature and extent of human occupation in the Uinta Basin during the PaleoIndian Period remains difficult without sufficient site data, the existence of these projectile points implies that the area was inhabited during the PaleoIndian Period.

The next period in the cultural chronological sequence of the Uinta Basin is known as the Early Archaic Period (ca 6,000 BC–3,000 BC). According to Jennings (1978), a shift to a "mobile hunting-collecting way of life" marks the transition from the PaleoIndian to the Early Archaic Period. In addition, new projectile point types also appear during the Early Archaic Period (i.e., Pinto Series, Humboldt, Elko Series, Northern Side-Notched, Hawken Side-Notched, Sudden Side-Notched, and Rocker Base Side-Notched). This change in projectile point production is seen by some as a reflection of the development of the atlatl for the pursuit of smaller, faster game (Holmer 1986). The discovery of projectile points characteristic of the Early Archaic Period in association with temporary camps and lithic scatters suggests human occupations in the region were sporadic. The Early Archaic inhabitants of the Uinta Basin likely practiced nomadic exploitation of local resources in small groups based on seasonal and locational availability (Spangler 1995). Although cultural remains from the PaleoIndian and Early Archaic Periods remain sparse in the Uinta Basin, dozens of archaeological sites representing the next cultural chronological sequence period, the Middle Archaic, exist in the region.

The shift from the Early Archaic to the Middle Archaic Period in the Uinta Basin is demonstrated by an increase in human populations and the appearance of the distinctive McKean Complex projectile points (Spangler 1995). The Middle Archaic Period (ca 3,000 BC–500 BC) sites illustrate cultural influences from the plains region of North America. The continued production and use of Elko Series projectile points, however, indicates cultural influences from the Great Basin and/or northern Colorado Plateau as well (Spangler 1995). Most researchers agree that Middle Archaic populations in the Uinta Basin were mobile foragers whose subsistence patterns included predominantly hunting, supplemented with gathering. This theory is supported by the fact that no permanent settlements have been discovered in the region, although a few semi-permanent base camps have been noted. Middle Archaic Period subsistence activities were likely conducted within the context of small bands. These small bands hunted game and procured locally available floral resources from one of these semi-permanent base camps (Spangler 1995). As the Middle Archaic Period transitioned into the Late Archaic Period, the subsistence strategies and settlement patterns that are generally associated with the Early and Middle Archaic Periods began to change.

As the Late Archaic Period (ca 500 BC–AD 550) began, McKean Complex projectile points vanish. Semi-subterranean residential structures began to appear regularly at base camps beginning around AD 1. At the same time, the introduction of maize horticulture, the bow and arrow, and Rose Spring arrow points suggest that, in addition to the traditional Archaic mobile hunter-gatherer subsistence strategies prevalent during the Early and Middle Archaic Periods, a new strategy incorporating horticulture and a more sedentary lifestyle emerged (Spangler 1995). The Archaic Periods were followed by a series of Formative Stage cultures, groups that were even more dependent on foods produced through horticulture (Jennings 1978).

The Formative Stage (ca AD 550–AD 1300) and the "Fremont culture," a term generally associated with the people of the Formative Stage, remains the most thoroughly investigated period of the cultural chronological sequence of the Uinta Basin. Even with the breadth of research associated with the Formative Stage, important questions regarding temporal ranges, geographic distribution, settlement patterns, and subsistence strategies, to name a few, remain unanswered. Some broad distinctions, however, can be made between the Late Archaic Period and the Formative Stage. In addition to a greater, perhaps dominant, importance placed on horticulture as a subsistence strategy, one such distinction involves an increase in the complexity of residential architecture. Architectural advancements include prepared clay floors, adobe-rimmed firepits, and coursed-masonry architecture (Spangler 1995). An increase in the size of food-storage structures, typically associated with food surplus, also demarcates the Formative Stage. The manifestation of small villages and farmsteads, elaborate rock art and figurines, and ceramics suggest an "enhanced social complexity" during this period (Spangler 1995).

In the Uinta Basin, specifically, the Fremont culture is characterized by "shallow, saucer-shaped pithouses or surface structures with randomly placed potholes and off-center firepits, some of which were adobe-rimmed" (Spangler 1995). Surface storage structures were nearly absent and Uinta Gray ceramics dominated all other types. Uinta Gray ceramics were constructed using a coil-and-scrape method are almost exclusively tempered with crushed calcite (Madsen 1977). Unlike the Fremont cultures in other portions of Utah, the Uinta Basin Fremont did not use the Utah-type metate nor did they produce unfired clay figurines. Gilsonite, a natural asphalt found only in the Uinta Basin, was used to repair broken ceramics (Marwitt 1970). The use of gilsonite marks another distinguishing feature of the Uinta Fremont. Projectile points used in the Uinta Basin during the Formative Stage include Rose Springs, Cottonwood triangular, Eastgate expanding-stem, and Elko corner-notched varieties. By AD 1300, evidence of the Fremont culture in the Uinta Basin disappears, giving way to what is commonly termed the Protohistoric Period (AD 1300–1650).

The reasons for the disappearance of Fremont culture sites in the Uinta Basin remain unclear. Some researchers postulate that climatic changes or the pressures of other cultural groups entering the region caused the Fremont culture abandonment (Jennings 1978). Others believe that the Fremont culture didn't actually abandon the Uinta Basin, but rather, that Fremont culture peoples coexisted with the new groups, such as the ancestral Ute (Uinta-ats) and Shoshone. A sheer lack of archaeological data associated with the Protohistoric Period in the Uinta Basin leaves many questions about the cultural continuity, or lack thereof, unanswered. Whatever the reasons, evidence points to a disappearance of horticulture and subsequent dominance of a more hunter-gatherer-oriented subsistence strategy, traditionally referred to as Shoshonean or Numic. Although earlier Formative Stage Fremont culture remains turn up at some archaeological sites dating to the Protohistoric Period, the Protohistoric Period material culture in the Uinta Basin, unlike earlier Fremont sites, includes Desert side-notched projectile points, Shoshonean ceramics, and occasionally, basketry and Shoshonean knives. Decidedly different rock art styles from those of the Formative Period also appear (Spangler 1995). One distinct aspect of Protohistoric Period rock art in the Uinta Basin is the representation of the horse. The introduction of the horse into the Uinta Basin cultures occurred sometime during the late stages of the Protohistoric Period. Contact between Euro-American peoples and Native American groups to the south eventually led to the animals' dissemination into the basin. The introduction, and subsequent dependency, of the horse in Protohistoric Period cultures marks the shift to the next period in the cultural chronological sequence of the Uinta Basin.

The Historic Ute Period (ca AD 1650–present) follows the Protohistoric Period. According to Spangler (1995), the Historic Ute Period actually consists of three distinct phases, the Antero Phase (ca AD 1650–1861), the Early Reservation Phase (ca AD 1861–1881), and the Late Reservation Phase (ca AD 1881–present). The Antero Phase is generally classified as the time period when those Protohistoric Period groups living in the Uinta Basin first adopted a lifestyle highly dependent on the horse but prior to their confinement to reservations. Subsistence strategies during this time continued to include both hunting and gathering, although the introduction of the horse dramatically changed the dynamics of these strategies. Groups in the Uinta Basin became exceptionally mobile, exploiting floral and faunal resources all over Utah. In addition to buffalo, historical accounts reference seasonal hunting forays into the Uinta Basin for fish, fowl, and lacustrine plant resources (Spangler 1995). Small bands of 10 to 40 individuals, and occasionally larger groups numbering in the hundreds, travelled throughout the region hunting and gathering.

Ute peoples during this period experienced rapid social, political, and economic change (Spangler 1995). The aforementioned use of horses contributed greatly to the changes, as did the arrival of Euro-American explorers into the Uinta Basin. According to historical descriptions, the first Euro-American explorers to enter the Uinta Basin were members of the small Spanish expedition from Santa Fe, New Mexico, headed by Fray Silvestre Velez de Escalante and Fray Francisco Atanasio Dominguez. The Dominguez-Escalante expedition traveled through the Uinta Basin in 1776 searching for a land route to Monterey, California. These explorers opened the Uinta Basin to Spanish, and later Mexican, American, and British fur-trappers and traders.

With the arrival of Euro-American explorers came trade with the Ute groups in the Uinta Basin. Euro-American items such as weaponry, blankets, metal utensils, and glass ornaments were often traded for animal furs during the early nineteenth century. This eventually led the Ute peoples to become increasingly dependent upon these trade goods. Euro-American trade with these Native American groups, along with intermarriage between Euro-Americans and the Native American groups in the Uinta Basin, “irreversibly altered traditional lifeways” (Spangler 1995). The practice of slave trading and exacting tribute from traders also became prevalent by the 1830s. Increased territoriality and warfare were among the results of such practices.

Several important U.S. government expeditions (official and unofficial) also visited the Uinta Basin during the Antero Phase, including the Captain John C. Fremont expedition in the 1840s. The government declared that the intent of these expeditions involved surveying and mapping undiscovered western territories (Spangler 1995). The Uinta Basin drew little interest during this initial exploration. Many saw the climate and environment as unsuitable for settlement. In 1852 Mormon leader Brigham Young ordered small survey parties to explore the Uinta Basin to determine the suitability for locating settlements there. Upon their return the survey parties reported that the Uinta Basin was one vast contiguity of waste and measurably valueless (Fuller 1994). As a result Young decided not to send Mormon settlers to the region. Mormon leaders did, however, decide that the Uinta Basin was a suitable region for the relocation of Ute peoples. Near the end of the Antero Phase, the social and political attitudes of the Mormon leaders toward the Native American groups led to their dispossession from their traditional territories around Utah Lake.

Violence resulting from the dispossession and relocation of the Ute peoples resulted in the creation of the first reservation in the Uinta Basin in 1861. The creation of the Uintah Reservation marks the beginning of the Early Reservation Phase of the Historic Ute Period. According to Spangler (1995), this phase is defined as the period when Ute peoples throughout Utah were systematically removed from their traditional territories and forced to live in the Uintah Reservation. The reservation originally included western Uintah County, most of modern-day Duchesne County, and the Strawberry Valley (Spangler 1995). Ute peoples participated in government-sponsored agricultural projects, and relations on the reservation were relatively peaceful. The arrival of government surveying parties in 1876 and the subsequent arrival of homesteaders to the reservation in the late 1870s, however, led the Ute peoples to suspect a government plan to open the reservation to white settlers. As the Early Reservation Phase came to an end, the Ute culture was experiencing “tremendous social upheaval precipitated by at least three decades of intensive association with Euro-Americans” (Spangler 1995). The Ute peoples of western Colorado were facing similar issues.

By 1881 violence over the dispossession of traditional territories in the region culminated in the forcible relocation of Ute peoples from western Colorado to a new temporary reservation, the Ouray Reservation, in the Uinta Basin. According to Spangler (1995), this marks the beginning of the Late Reservation Phase of the Historic Ute Period. The forced settlement of so many different Ute bands in the Uinta Basin led to serious friction. Increased Mormon settlement in the Uinta Basin continued to promote Ute fears of white settler infiltration of reservation lands. Ute lifeways now included cattle ranching, cultivation of crops, and dairy farming. The Late Reservation Phase was also marked by a decisive plan of enculturation by the U.S. government. Through the use of government-assigned reservation superintendents, Ute peoples were to be made into “carbon-copy white men” (Spangler 1995). The discovery of gilsonite and valuable hydrocarbon resources in the Uinta Basin in the late 1880s led to the withdrawal of 7,000 acres from the Uinta Reservation (Fuller 1994). The subsequent establishment of U.S. military forts and the official opening of the Uintah and Ouray Reservations to white settlement in 1887, with the Dawes Severalty Act, marked the final dispossession of the Ute peoples (Spangler 1995).

With an influx of white settlers (mostly farmers and ranchers) entering the Uinta Basin, complex irrigation systems and additional rangelands were needed. This led to the dispossession of Ute peoples from the reservation lands originally set aside for their exclusive use following their previous dispossession from traditional territories. Initially, livestock represented the main industry of white settlers in the Uinta Basin, likely due to the availability of grass and water in the region. Eventually, the sheep industry boomed, contributing to a decline in the cattle industry (Lower-Eskelson 2007). Commercial oil production began in 1948 but was not fully exploited until the 1970s with increases in the price of crude oil. Consequently, private and public ventures began work to develop an inexpensive process for separating oil from oil shale and tar sands, both prevalent in the Uinta Basin.

Around 1980, international oil prices began to fall and the economic health of the Uinta Basin, based heavily on the oil industry, fell sharply. The development of water resources for other parts of Utah, especially the Wasatch Front, led to another temporary economic stimulus. Today, little evidence of the aforementioned economic flourishes remains (Fuller 1994). What does remain is a fairly small population base of both white farmers and ranchers as wells as Ute peoples on the Uintah and Ouray Reservation, who are supported by a fragile economy based on petroleum and mining. According to Burton (1996), an estimated 30 percent of jobs in the Uinta Basin were related to mining and petroleum.

Existing Cultural Resource Information

A Class I cultural resource literature search was conducted by Reclamation at the Division of State History, Utah State Historic Preservation Office on October 19, 2011, to identify any previously conducted cultural resource inventories and recorded cultural resource sites within the Study Area. Files from Reclamation and General Land Office maps were also examined. As a result of the literature search, 21 previously conducted cultural resource inventories and 54 previously recorded cultural resource sites were identified within the Study Area.

Of the previously recorded sites, 10 are historic in nature. Of these sites, eight have been previously determined ineligible for the NRHP, while the other two have been previously determined eligible. Forty-three of the previously recorded sites are prehistoric in nature. Twenty-two of the prehistoric sites have been previously determined eligible for the NRHP, while 18 of the sites have been determined ineligible. The eligibility of the other three prehistoric sites remains undetermined. One site has both prehistoric and historic components. The site has been previously determined ineligible for the NRHP.

The Steinaker Reservoir RMP establishes only a conceptual framework for managing cultural resources at Steinaker Reservoir and does not implement any specific projects. As such, the scope of this RMP focuses on a broad scale of cultural resource impacts associated with the array of alternatives and their broad levels of proposed development within the Study Area. Site-specific cultural resource impacts will be addressed as part of separate NEPA and Section 106 compliance processes prior to the implementation of individual projects proposed as part of the selected RMP; those site-specific impacts are not addressed in this RMP.

Paleontological Resources

Paleontological resources are defined as any fossilized remains, traces, or imprints of organisms, preserved in or on the earth's crust, that are of paleontological interest and that provide information about the history of life on earth. Any materials associated with an archaeological resource (as defined in section 3(1) of the Archaeological Resources Protection Act of 1979 (16 U.S.C. 470bb(1) and any cultural item (as defined in Section 2 of the Native American Graves Protection and Repatriation Act (25 U.S.C. 3001) are not considered paleontological resources. Section 6302 of the Paleontological Resources Preservation Act (PRPA) of 2009 (Sections 6301-6312 of the Omnibus Land Management Act of 2009 [Public Law 111-11 123 Stat. 991-1456]) requires the U.S. Secretary of the Interior to manage and protect paleontological resources on federal land using scientific principles and expertise. The affected environment for paleontological resources is represented by the same proposed action Study Area APE that corresponds to cultural resources.

Paleontological History

The following is a very brief overview of the paleontological history of the Study Area. Due to the extensive nature of the geologic record in the Study Area, a more detailed history of paleontological history has been omitted. A comprehensive paleontological history is available in various paleontological publications associated both with the paleontology specifically at Steinaker Reservoir (Santucci and Zack 2001) as well as nearby (Sloan et al. 1980).

The rock formations exposed within the Study Area are of sedimentary origin. These sediments were originally deposited under a variety of environmental conditions, mainly marine in nature. At the end of the Cretaceous period, approximately 65 million years ago, geologic processes created an uplift, resulting in the formation of the Uinta Mountains. This process led to a transition from marine sediments to what we see in the Study Area today, mainly a sequence of sandstones and shales with minor limestones (Sloan et al. 1980). Sedimentary exposures in the Study Area span the Middle Jurassic Period through the Late Cretaceous Period of the Mesozoic era (dating from about 176 million to 65 million years ago). In addition, Quaternary alluvium from the Cenozoic era (dating from about 65 million years ago to present) also appear. Various paleontological resource types are known to exist within the same formations found in the Study Area. These include, but are not limited to, petrified or carbonized wood, marine vertebrates and invertebrates, and ichnofossils (Santucci and Zack 2001).

Existing Paleontological Resource Information

A paleontological resource file search was conducted by the Utah Geological Survey, at the request of Reclamation, on January 23, 2012, to identify any previously conducted paleontological resource surveys and recorded paleontological resource localities within the Study Area. Files at Reclamation were also examined. One previously conducted paleontological resource survey and 13 previously recorded paleontological resource localities were identified within the Study Area during the file search.

Paleontological resources localities within the Study Area include fossil plant remains as well as invertebrates such as brachiopods, bivalves, and belemnites. Several vertebrate fossils have also been recovered from the Study Area. These include not only fish scales and a partial fish skeleton, but also pliosaur and plesiosaur remains. Ichnofossils, such as a possible tracksite, also appear in the Study Area (Santucci and Zack 2001).

The Steinaker Reservoir RMP will establish only a conceptual framework for managing paleontological resources at Steinaker Reservoir and does not implement any specific projects. As such, the scope of this RMP focuses on a broad scale of paleontological resource impacts associated with the array of alternatives and their broad levels of proposed development within the Study Area. Site-specific paleontological resource impacts will be addressed as part of separate NEPA and PRPA compliance processes prior to the implementation of individual projects proposed as part of the selected RMP; those site-specific impacts are not addressed in this RMP.

Indian Trust Assets (ITAs)

Indian Trust Assets are legal interests in property held in trust by the United States for Indian tribes or individuals. Indian Trust Assets may include lands, minerals, hunting and fishing rights, traditional gathering grounds, and water rights. Impacts to ITAs are evaluated by assessing how the action affects the use and quality of ITAs. Any action that adversely affects the use, value, quality or enjoyment of an ITA is considered to have an adverse impact to the resources.

The DOI's policy is to recognize and fulfill its legal obligations to identify, protect and conserve the trust resources of federally recognized Indian tribes and tribal members, and to consult with tribes on a government-to-government basis whenever plans or actions affect tribal trust resources, trust assets, or tribal safety (please refer to Departmental manual, 512 DM 2). Under this policy, as well as Reclamation's ITA policy, Reclamation is committed to carrying out its activities in a manner that avoids adverse impacts to ITAs when possible and mitigate or compensate for such impacts when avoidance is not possible. All impacts to ITAs, even those considered non-significant, must be discussed in the trust analyses in NEPA compliance documents and appropriate compensation or mitigation must be implemented.

Reclamation contacted the Bureau of Indian Affairs (BIA) Uintah and Ouray Agency in Fort Duchesne, Utah to identify any potential impacts to ITAs within the Study Area. According to the BIA, the only known ITA involves a water right in the Green River held in trust for the Ute Indian Tribe of the Uintah and Ouray Reservation.

Energy, Minerals, and Other Extractive Resources

Mineral resources are divided into three categories: locatable, leasable, and saleable. Locatable minerals include gold, silver, lead, zinc, and other "high value" metallic ores subject to the Mining Law of 1872, as amended by 30 U.S.C. Ch. 2. Leasable minerals are oil and gas, oil shale, coal, potash, phosphate, sodium, gilsonite, and geothermal resources. These are subject to lease under the Mineral Leasing Act of 1920, as amended and supplemented (30 U.S.C. 181, et seq.), the Mineral Leasing Act for Acquired Lands as amended (30 U.S.C. 351-359), and the Geothermal Steam Act of 1970, (30 U.S.C. 1001-1025). Saleable minerals are of the common variety and include sand, stone, gravel, pumice, cinders, clay, and other minerals extracted in bulk such as petrified wood. These minerals are subject to sale and disposal at the discretion of Reclamation under the Act of July 31, 1947, as amended (30 U.S.C. 601 et seq.); the Act of July 23, 1955 (30 U.S.C. 601); the Act of September 28, 1962 (30 U.S.C. 611); and Section 10 of the Reclamation Projects Act of 1939 (43 U.S.C. 387). Except for minerals and conditions meeting the provisions of section 10 of the Reclamations Projects Act of 1939, leases for mineral and geothermal resources on all land acquired or withdrawn by Reclamation are issued by the BLM.

Leasable minerals are under discretionary authority, meaning they are open to development through application and permitting by the BLM with concurrence of Reclamation. Under the present Interagency Agreement (December 1982), the BLM will, in all issues involving mineral and geothermal leases, request that Reclamation determine whether leasing is permissible and, if so, provide any stipulations required to protect the interests of the United States. Currently, no formal Reclamation stipulations exist for the Study Area.

No evidence of mineralization was observed during an October 2011 site visit by the Steinaker Reservoir RMP/EA Interdisciplinary Project Team (Project Team). No past locatable mineral development has occurred within the Study Area. Most of the Study Area consists of steep slopes, open water, and recreational or administrative areas. Therefore, locatable mineral resource exploration or development in the Study Area is unlikely. However, the potential for hydrocarbon resources does exist within the Study Area. Several gas fields are located in the vicinity of Steinaker Reservoir. As with locatable mineral resources, the exploration or development of leasable minerals is unlikely because of the limited surface area available. There are also saleable mineral resources (e.g., sand, gravel, and cobbles) in the Study Area, some of which have previously been extracted, in the southeast corner of the Study Area. This area is also frequently used by off-highway vehicles.

Waste Water, Solid Waste, and Hazardous Materials

Wastewater generated by State Park restrooms and office facilities is treated using septic tanks and absorption fields within the Study Area. There are a total of five septic tanks and drain fields. There are separate septic tanks for each of the following: the campground, main office, shop, day-use area and fish-cleaning station, camp trailer area in the maintenance yard, and dump station (M. Murray 2012b). The Eagle Ridge group area is served by a vault toilet. The UWCD office and shops in the Reclamation administration area are served by a septic system.

All solid waste is transported out of the Study Area for disposal in a local landfill.

Hazardous materials are not used in the Study Area. No evidence of spills, contamination problems, or hazardous materials were identified within the Study Area. There are two aboveground fuel tanks near the State Parks maintenance shop, but these are no longer used and are expected to be sold as surplus equipment. The UWCD shop has a 1,000-gallon aboveground gasoline storage tank and a 500-gallon aboveground diesel fuel storage tank. Both tanks have secondary containment (J. Hunting 2012, pers. comm.).

Land Management

This section describes current land management conditions that affect Study Area resource management, including ownership and transportation characteristics as well as existing legal, institutional, and land-use constraints (e.g., existing contracts between Reclamation and other entities). Legal constraints include legislative acts, compacts, and agreements that govern the diversion and use of water from Ashley Creek and, specifically, water stored in Steinaker Reservoir. Institutional constraints include water delivery contracts or water rights and Reclamation’s administrative procedures that govern the management and use of Study Area facilities. Land-use constraints include existing Memorandums of Understanding, contracts, lease agreements, permits, easements, and rights-of-way (ROWs) that govern the management and use of Study Area resources.

Land Ownership and Management

Figures 1-1 and 1-2 illustrate land ownership characteristics surrounding the Study Area. Lands surrounding Steinaker Reservoir are either private lands or BLM-administered federal lands, as illustrated on Figure 1-2.

Transportation and Access

Roads entering the Study Area are illustrated on the Study Area map (Figure 1-2). Steinaker Reservoir is accessed by US-191. The highway enters Reclamation lands approximately 2 miles north of the Vernal city limits (Figure 1-2). There are several informal turn-outs along the west side of the highway, where there are reservoir overlooks. These turn-outs are also used by the public to park and access the reservoir for fishing. On busy days, additional parking in non-designated areas occurs along both sides of US-191.

State Route 301 provides access to the west side of the reservoir, where the existing developed State Park facilities are located. State Route 301 is accessed from US-191 near the northern boundary of Reclamation lands, approximately 5.6 miles from downtown Vernal. State Route 301 terminates at the boat ramp in the State Park, approximately 1.7 miles from the highway turnoff. There is also private road access off SR-301 approximately 0.6 miles from the intersection. State Route 301 is under the jurisdiction of UDOT (Utah Code 72-3-206).

A city road, 500 East Street, connects with US-191 within Reclamation lands in the southeast corner of Reclamation property (i.e., the Honda Hills Area). Little Valley Road is a Uintah County unimproved (Class D) road that also enters Reclamation land in this vicinity from the north. Reclamation lands at this location are informally used as a parking and staging area for OHV riding. Little Valley Road provides access to popular OHV riding trails on BLM lands and also crosses through a portion of Reclamation lands at Red Fleet Reservoir (Figure 1-1).

Legal Constraints

Legal constraints include legislative acts, compacts, and agreements that govern the diversion and use of water from Ashley Creek and, specifically, water stored in Steinaker Reservoir.

Reclamation Act of 1902

In the Reclamation Act of June 17, 1902, the U.S. Congress authorized construction of irrigation projects in arid and semiarid lands that now comprise the western United States (43 U.S.C. § 301). General authority over these projects was assigned to the U.S. Secretary of the Interior; project administration and oversight responsibilities were assigned to Reclamation. Proceeds from sales of public lands were placed into a Reclamation fund to assist in paying for the irrigation projects. Reclamation is the agency responsible for overall resource and facility management within the Study Area.

Colorado River Storage Project Act of 1956 as amended (1962, 1964, 1968, and 1980)

The Colorado River Storage Project Act of 1956 as amended (1962, 1964, 1968, and 1980) provides for the following: (1) the comprehensive development of the water resources of the Upper Colorado River Basin to regulate the flow of the Colorado River; (2) water storage for beneficial consumptive use, making it possible for states of the Upper Basin to use the apportionments made to and among them in the Colorado River Compact and the Upper Colorado River Basin Compact, respectively; and (3) the reclamation of arid and semiarid land, control of floods, and generation of hydroelectric power. The act authorizes the U.S. Secretary of the Interior to construct, operate, and maintain initial units of the Colorado River Storage Project and additional reclamation projects (referred to as “participating projects”) in the Upper Colorado River Basin. The units and projects consist of dams, reservoirs, power plants, transmission facilities, and appurtenant works. The Central Utah Project (CUP) is a participating project of the Colorado River Storage Project and Steinaker Dam is a component of the Vernal Unit of the CUP. Steinaker Reservoir is an off-channel reservoir. Other components of the

Vernal Unit are the Fort Thornburgh Diversion Dam and Steinaker Feeder Canal, which supply water to Steinaker Reservoir from the Ashley Creek drainage.

Reclamation Recreation Management Act of 1992

The Reclamation Recreation Management Act (Public Law 102-575) provides uniform policies regarding recreation developments, fish and wildlife enhancements, cost sharing of federal multipurpose water resource projects, and other purposes. As part of the policies section on management of Reclamation lands, the U.S. Secretary of the Interior is authorized to develop, maintain, and revise RMPs for Reclamation lands. The RMPs shall provide for the development, use, conservation, protection, enhancement, and management of resources on Reclamation lands in a manner that is compatible with the authorized purposes of each specific Reclamation project.

Institutional Constraints

Institutional constraints for resource planning include existing water delivery contracts, water rights, and the Reclamation administrative procedures that govern the management and use of Study Area facilities.

Reclamation's Emergency Management Policies and Directives

Reclamation's Emergency Management Policies and Directives provide for safety and protection of environmental resources from incidents at Reclamation storage dams and reservoirs by: (1) taking the reasonable and prudent actions necessary to ensure timely notification to potentially affected jurisdictions of such incidents, and (2) defining program needs and requirements essential to maintain self-regulation by line managers, be responsive to public safety, and satisfy legal requirements during operations or emergency incidents at Reclamation facilities. This program also requires that an Emergency Action Plan be written for each dam to include emergency management initiating conditions, response levels, and expected actions. The Emergency Action Plan for Steinaker Reservoir was completed and signed April 12, 2012.

Standing Operating Procedures (SOPs)

Standing Operating Procedures (SOPs) are prepared for all Reclamation dams and reservoirs to establish, in one primary document, the complete, accurate, current, structure-oriented operating instructions for each dam and reservoir and its related structures. The document's purpose is to ensure adherence to approved operating procedures over long periods of time and during changes in operating personnel. Operating procedures shall not deviate from those stated in the SOPs without appropriate authorization. The SOP for Steinaker Reservoir and Dam was signed into effect on March 25, 2004.

Water Operations

Steinaker Reservoir has a total capacity of 38,173 acre-feet, and a surface area of 820 acres. Steinaker Dam and Reservoir were turned over to the UWCD for operation and maintenance on January 1, 1967. Management of all water operations associated with Steinaker Reservoir are the responsibility of the UWCD.

Land Use Constraints

Land use constraints for resource planning include existing policies and agreements that define management and agency jurisdiction, authorities, and responsibilities for the use, enhancement, and protection of resources within the Study Area. These include existing Memorandums of

Understanding, contracts, lease agreements, permits, easements, and ROWs that govern the management and use of Study Area resources. The following is a list of contracts and agreements on file with Reclamation.

Reclamation Contracts

- Memorandum of Agreement 01-LM-40-02110 between Reclamation and State Parks and Recreation for Management of Recreation Facilities at Steinaker Reservoir.

- Repayment Contract 14-06-400-778 between the United States and UWCD, July 14, 1958.

    - Amendment to Contract 14-06-400-778, November 26, 1975.

Concession Agreements

- None.

Licenses, Leases, and Permits

- None.