Chapter 2

Existing Conditions

2.1 Climate

The climate in the RMP area is semiarid with cold winters and hot, dry summers. Annual precipitation averages about 10 to 12 inches, with snowfall averaging 30 inches. Most precipitation falls during the fall, winter, and spring. Summer rainfall is quite low, but some precipitation falls each month. About 24 thunderstorms occur each year and most occur in the summer. Winters are relatively mild for the elevation, with average winter temperatures varying from 15 to 25°F. Temperatures below 0°F occur for very short periods. Summer temperatures vary considerably from day to day, but most days are cloudless and warm and the nights are cool. Daily temperatures average in the mid-60s to mid-80s during the summer, and the frost-free period ranges from 100 to 120 days. The prevailing winds average 10 miles per hour from the southwest.

2.2 Air Quality

Air quality is monitored by the Idaho Department of Environmental Quality and the results are stored in a U.S. Environmental Protection Agency (EPA) database. Areas with persistent air quality problems are noted in the database as "nonattainment" areas. There are no nonattainment areas recorded by EPA in the RMP Study Area. Power County, just east of the RMP area, is a nonattainment area for particulate matter less than 10 microns in size (PM10), which typically results from airborne dust. Blowing dust is a concern in the RMP area throughout the year during windy conditions, and especially during dry years.

2.3 Topography and Geology

At Lake Walcott, the Snake River flows from east to west (see Figure 2.3-1). The terrain surrounding the reservoir and throughout the project area is generally flat (see Photo 2-1). The Snake River in southeastern Idaho lies approximately on the boundary between the Snake River plain, which is part of the Columbia Lava Plateau physiographic province, and the Basin and Range province. The mountainous areas south of the Snake River are composed of various Precambrian rocks and Paleozoic marine sedimentary rocks. The Snake River Plain north of the Snake River (and on which the RMP area is located) is composed chiefly of Quaternary basalt with interbedded sediments.

The entire Minidoka North Side RMP Study area is underlain by the Quaternary Snake River Basalt formation. This basalt bedrock formation was scoured into scablands about 15,000 years ago by the Lake Bonneville flood.

Photo 2-1. Minidoka North Side parcels are located on areas distinguished by mostly flat topography as shown in this typical landscape view.

This scabland terrain is seen on the north side of Lake Walcott in the rugged topography with a relief of several meters, exposed rock, and isolated sediment-covered areas (see Photo 2-2). Overlying the bedrock are sediments deposited by the Bonneville Flood, including sand, silt, and gravel. Much of this sediment lies in a mantle of windblown loess and sand throughout the RMP area.

2.4 Soils

Soils in the RMP Study Area have formed under shrub and grassland vegetation types. Underlying parent materials consist of irregular topographic basalt flows, as well as alluvial and eolian deposits. Alluvial deposits are gradually formed along a river through deposition of sediments. Eolian deposits are wind deposited materials, frequently formed as a result of volcanic eruptions.

Most soils are deep to very deep and are formed on level to gently sloping ground, although rock outcrops and shallow soils are found throughout the RMP Study Area. Specifically, soils in the RMP Study Area vary from silt loam and fine sandy loam deposited by wind over basalt to silty clay loam deposited on low alluvial terraces. Subsurface materials range from fine sands to very stony sandy loam. Basalt is the predominant subsurface material.

Certain soils have weakly cemented calcium or silica hardpans of varying thickness at the 12- to 36-inch depth. Scattered areas of high water tables, and salinity-affected soils, can be found north of the Snake River in the southern part of the RMP Study Area. There is a moderate risk of wind and water erosion from certain soils, although this problem is not widespread. Shrink-swell potential is moderate in some soils.

2.4.1 Soil Considerations for Wetland Development

Many of the parcels listed for potential wetland development in Table 2.4-1 are quite large and include more than one soil type, as well as variations within a particular type. Additionally, specific locations for potential wetland development have not been identified. Therefore, additional site-specific information regarding site suitability for wetland development will need to be evaluated on a case by case basis once specific locations are identified.

Photo 2-2. Large basalt rock outcropping known as the “Cinder Pit.”

Insert Figure 2.3-1.

Back of Figure 2.3-1.

Table 2.4-1. Soil Characteristics of Potential Wetland Creation Locations in the Minidoka North Side RMP Study Area.

Parcel Number	Soil Survey	Dominant Soil Series	Soil Constraints/Opportunities	Other Constraints/ Opportunities
724-2-W	Minidoka Area	Sluka Silt Loam, 1-4% slopes	5-18% clay will not hold water well; hardpan at 20-40 inches; low gravel content	
821-2-W	Jerome County	Power Silt Loam, 1-4% slopes	15-30% clay enhances water holding capacity; low gravel content	
822-1-W	Minidoka Area	Power-McCain Complex, 1-4% slopes	McCain part of complex has shallow depth to bedrock	
825-4-W	Minidoka Area	Portneuf Silt Loam, 1-4% slopes	6-13% clay will not hold water well	
	Minidoka Area	Sluka Silt Loam, 1-4% slopes	5-18% clay will not hold water well; hardpan at 20-40 inches; low gravel content	
921-12-W	Jerome County	Chiara Silt Loam, 1-8% slopes	<10% clay will not hold water; hardpan at 10-20 inches	
	Jerome County	Dolman Silt Loam, 1-4% slopes	<15% clay will not hold water; hardpan at 20-40 inches	
	Jerome County	Barrymore-Starbuck Complex, 1-4% slopes	Shallow (18-25 inches to bedrock)	
921-13-W	Jerome County	Chiara Silt Loam, 1-8% slopes	<10% clay will not hold water; hardpan at 10-20 inches	
	Jerome County	Dolman Silt Loam, 1-4% slopes	<15% clay will not hold water; hardpan at 20-40 inches	
	Jerome County	Barrymore-Starbuck Complex, 1-4% slopes	Shallow (18-25 inches to bedrock)	
	Jerome County	Tulch Silt Loam, 0-2% slopes	10-30% clay is variable relative to water holding	
921-5-W	Jerome County	Chiara Silt Loam, 1-8% slopes	<10% clay will not hold water; hardpan at 10-20 inches	
	Jerome County	Sluka Silt Loam, 1-4% slopes	5-18% clay will not hold water well; hardpan at 20-40 inches; low gravel content	
922-3-W	Minidoka Area	Bahem Silt Loam, 4-8% slopes	10-18% clay is variable relative to water holding capacity; low gravel content	
	Minidoka Area	Pocatello Silt Loam, 12-30% slopes		May get too steep
925-6-W	Minidoka Area	Gravel Pits		May already have water table established
	Minidoka Area	Tindahay Sandy Loam, 0-1% slopes	Predominately sandy soils greater than 23 inches in depth; will not hold water	
921-6-W	Jerome County	Sluka Silt Loam, 1-4%slopes	5-18% clay will not hold water well; hardpan at 20-40 inches; low gravel content	
1022-6-W	Minidoka Area	Pocatello Silt Loam, 12-30% slopes		Need to identify vetch when it flowers; may get too steep

Source: Compilation of data from Natural Resource Conservation Service (NRCS) 1975, 1994, and 1998 by CH2M HILL.

Various soil characteristics affect the difficulty with which wetlands can be created on a particular parcel. These characteristics include soil texture (relative percentages of sand, silt, and clay), prevalence of coarse fragments (rock, stone, and gravel); and presence of restrictive layers in the soil profile (hardpans or clay lenses). Characteristics conducive to wetlands creation include a high percentage of clay and silt, none to very few coarse fragments, and a clay lens deep in the soil profile. Physical limitations, such as steep slopes, may limit potential wetland development. Table 2.4-1 lists the potential wetland creation sites and known soil or physical constraints (if any) associated with the sites.

2.5 Water Resources and Hydrology

The only natural surface waters that occur within or adjacent to the boundaries of the Minidoka North Side RMP Study Area are the Snake River and Lake Walcott, formed by Minidoka Dam on the Snake River. However, these surface waters are not included in the RMP. Therefore, they are only briefly discussed.

2.5.1 Surface Waters

The Snake River lies in the southerly portion of the RMP Study Area. Reclamation's Minidoka Dam is located at the east end of the RMP Study Area. It is a diversion and storage structure that impounds Lake Walcott (see Photo 2-3). The Main North Side Canal, which serves the lands of the MID, heads at Minidoka Dam.

The Snake River Plain lacks a well-defined stream drainage pattern because of its youthful stage of geologic development, its limited precipitation, and its gentle slopes.

Photo 2-3. Lake Walcott as seen from the State Park.

As a result, the RMP Study Area has some enclosed drainage basins—relatively shallow depressions with no natural drainage outlets. The Snake River is the primary river of southern Idaho and its waters are diverted for irrigation on lands within the RMP Study Area boundary. Man-made surface waters include irrigation canals, return flow drains, and drain-water wetlands.

2.5.2 Groundwater

The Snake River Plain aquifer lies beneath the RMP Study Area and encompasses an area of about 10,800 square miles, extending from St. Anthony to Bliss, Idaho, a distance of 180 miles. The aquifer averages about 60 miles wide.

The Snake River Plain consists of a thick series of basalt flows under the northern part of the RMP Study Area and basalt flows interbedded with large amounts of fine-grained lake sediments to the south. The aquifer is fed by seepage from streams that enter or cross the plain, underflow from tributary valleys, seepage from irrigation, and from precipitation on the plain and bordering foothills. Discharge from the aquifer occurs as spring flows concentrated near the upper end of American Falls Reservoir and at Thousand Springs near the lower end of the aquifer and as groundwater pumpage for domestic, municipal, and irrigation supplies.

Data obtained from the Idaho Department of Water Resources (IDWR) indicates that the depth of groundwater below ground surface for wells in the RMP Study Area ranges from less than 10 feet to 400 feet. Depth to groundwater will likely be more shallow than indicated by well head values because of the perched water table. Perched water tables are irregular mounds in the regional water table that are often created through irrigation. Water yields from deep wells range from a high of several thousand gallons per minute per foot of drawdown in the predominantly basalt aquifer to the north to lows of less than 100 gallons per minute per foot of drawdown in the less permeable sediment-basalt aquifer to the south.

2.6 Water Quality and Contaminants

The land surface of the Snake River Plain in the RMP Study Area is flat to gently rolling, with smooth benches and small knolls. While the Snake River itself is deeply incised, the land area nearby often lacks well defined stream drainage patterns and has many local catchments formed within the landscape. As a result, relatively shallow depressions with no natural drainage outlets act as closed basins for low to moderate storm events.

In 1991, EPA designated the Snake River Plain Aquifer as a sole source of drinking water under the Federal Safe Drinking Water Act. The EPA designation of the eastern Snake River Plain Aquifer as a sole source of drinking water has resulted in increasingly more stringent water quality standards.

All of the water diverted to the MID from the Snake River is delivered through a network of canals and laterals that are predominantly gravity fed (see Photo 2-4). Occasionally, pumps are used in the MID to lift surface water from a canal or drain where it enters a new lateral for distribution. A&B gets most of its water from wells (Unit B). The A&B has a limited canal system in the far southwest end of the district where it pumps water from the Snake River (Unit A).

Photo 2-4. Irrigation canals on one of the Minidoka North Side parcels.

Because of the lack of natural surface drainage outlets to the Snake River and constraints associated with drainage into the southern portions of the MID, most drainage return flows and storm water from Unit B are disposed of through injection wells that pass water directly into the underlying groundwater aquifer. There are 78 injection wells within A&B, of which 27 are still active. Within the MID, there are 5 injection wells, of which at least 2 are still active (see Photo 2-5).

In 1973, IDWR, through a grant from EPA, conducted an investigation to evaluate the impact of injection wells on the water quality of the Snake River Plain aquifer. A study site was selected in the A&B irrigation district where the basalt formations represented typical geologic conditions at injection well sites.

Photo 2-5. Injection well used to force return flows and storm water back into the aquifer.

Study results indicated that discharge to the injection wells was not symmetrical in the recharge zone, and the extent of the water in this zone became larger during each successive discharge sequence. This indicated that the discharge water in the receiving zone rapidly moves laterally into the receiving system. Groundwater flow in the upper receiving system moved through fractures and channels in the overlying basalt after the discharge zone had become saturated.

Purification of the discharged water moving both laterally through the recharge zone and vertically through the underlying basalt was limited. Bacterial levels within the recharge zone of both the deep perched water zone and the confined aquifer were similar to those of the discharged water. Turbidity, however, was reduced as the discharge water percolated downward through the basalt formations.

The quality of return flows is highly variable, depending on its source, method and rate of application, amount of fertilizer added, and other factors (Seitz 1977). In general, dissolved solids are increased because of leaching of minerals from the soil and from application of fertilizers. Nutrient concentrations are generally significantly higher in irrigation waste water than in the applied water. Bacteria concentrations are also significantly higher.

Drain water quality for six drain locations within A&B is summarized on Table 2.6-1. Overall, the drain water quality within A&B is generally good considering that this water is not intended for primary human contact; the data is not unexpected for agricultural drain water. Suspended sediments are within normal limits. Nitrogen values within H Drain are higher than other drain locations and all were high compared to water quality standards. Bacteria levels were also substantially higher than water quality standards, especially within the D Drain.

Drain water quality for six drains within MID is summarized on Table 2.6-2. Drain data are summarized from upstream to downstream discharges into the Snake River. Overall, the drain water quality within MID is good. Bacteria and suspended sediments are all within normal limits. Total phosphorus and turbidity values are relatively low and are actually better than expected for irrigation drain flows. Nitrogen values within the D-4 Drain are higher than other drain locations and all were high compared to water quality standards. Again, drain water is not intended for primary human contact. Phosphorous levels were also higher substantially than water quality standards, especially in the D-3 and D-4 drains. But this, too, was expected for agricultural drain water. No data was evaluated for the Southside Canal within MID.

Recent data (1996 to 2001) within MID suggest that concentrations of nitrate/nitrogen dioxide (NO3/NO2), fecal coliform bacteria, and total coliform bacteria are generally lower than those found in the Minidoka North Side Pumping Division from 1981 to 1992, which is summarized in Table 2.6-3. Fecal coliform bacteria

Table 2.6-1. A&B Irrigation District Drain Water Quality.

Location and Analysis Method	Sample ID	NO3/NO2 mg/L	Fecal Coliform ct/100mL	Totals ct/100mL	E. coli ct/100mL	Suspended Solids mg/L
D-Drain						
average	26AD724 D-drain	2.02	2,126	4,638	—	4
median	26AD724 D-drain	2.03	700	1,120	—	4
max	26AD724 D-drain	2.53	15,100	39,000	—	7
min	26AD724 D-drain	1.65	2	20	—	1
F-Drain						
average	F-drn end infl to Cap@Hwly Weir	0.90	287	468	39	12
median	F-drn end infl to Cap@Hwly Weir	0.75	160	370	28	5
max	F-drn end infl to Cap@Hwly Weir	2.41	1,060	1,600	90	60
min	F-drn end infl to Cap@Hwly Weir	0.07	30	70	10	<1
average	F-drain below Cemetery Pond	2.94	257	755	—	34
median	F-drain below Cemetery Pond	2.94	257	755	—	34
max	F-drain below Cemetery Pond	3.97	1,060	3,000	0	93
min	F-drain below Cemetery Pond	2.13	16	20	0	4
H-Drain						
average	Infl to drn WLL5AD923ON Hdrn	5.03	918	1,210	—	9
median	Infl to drn WLL5AD923ON Hdrn	5.02	600	960	—	4
max	Infl to drn WLL5AD923ON Hdrn	5.36	2,200	2,300	—	33
min	Infl to drn WLL5AD923ON Hdrn	< 0.01	30	70	—	2
average	Goyne Sump S10 T9 R23	0.02	957	1,148	—	4
median	Goyne Sump S10 T9 R23	0.02	957	1,148	—	4

Table 2.6-1. A&B Irrigation District Drain Water Quality.

Location and Analysis Method	Sample ID	NO3/NO2 mg/L	Fecal Coliform ct/100mL	Totals ct/100mL	E. coli ct/100mL	Suspended Solids mg/L
max	Goyne Sump S10 T9 R23	0.05	3,200	3,600	—	11
min	Goyne Sump S10 T9 R23	< 0.01	14	50	< 2	< 1
E-Drain						
average	Edrn@Edrn Stlngpnd nr rd clvrt	3.35	448	767	245	9
median	Edrn@Edrn Stlngpnd nr rd clvrt	3.35	448	767	245	9
max	Edrn@Edrn Stlngpnd nr rd clvrt	4.21	2,400	2,600	430	20
min	Edrn@Edrn Stlngpnd nr rd clvrt	2.38	12	70	16	<1
ALL DRAINS 1999-2001						
average		2.04	713	1,284	95	10
median		2.48	524	863	137	5
max		5.36	15,100	39,000	430	93
min		0.07	2	20	0	1

Source: Compilation of available data by CH2M HILL.

Table 2.6-2. Minidoka Irrigation District Drain Water Quality.

Sample ID	Analysis Method	NO3/NO2 mg/L	Ortho-P mg/L	T-Phos mg/L	NH3 mg/L	TKN mg/L	Fecal ct/100mL	Totals ct/100mL	Suspended Solids mg/L	Turbidity NTU
D-3 d/s A1 Canal	average	2.43	0.08	0.10	0.05	0.40	201	392	3	2
D-3 d/s A1 Canal	median	2.42	0.08	0.11	0.04	0.39	120	240	2	2
D-3 d/s A1 Canal	max	5.01	0.22	0.24	0.27	0.78	1100	1900	8	4
D-3 d/s A1 Canal	min	0.83	0.01	0.03	< 0.01	0.16	10	22	< 1	< 1
D-4 1/4 Mi u/s Snake River	average	4.80	0.09	0.11	0.03	0.46	203	680	6	2
D-4 1/4 Mi u/s Snake River	median	4.70	0.08	0.10	0.03	0.46	136	320	4	2
D-4 1/4 Mi u/s Snake River	max	7.98	0.26	0.28	0.09	0.75	900	5800	44	6
D-4 1/4 Mi u/s Snake River	min	1.20	0.01	0.03	< 0.01	0.19	10	62	< 1	< 1
D-16 nr old MID Flume	average	0.93	0.03	0.06	0.07	0.47	121	449	5	2
D-16 nr old MID Flume	median	0.88	0.03	0.06	0.06	0.47	90	305	3	2
	max	1.84	0.11	0.13	0.17	0.84	640	1250	50	5
D-16 nr old MID Flume	min	0.24	0.00	0.01	0.01	0.14	10	40	< 1	< 1
D-6	average	0.48	0.05	0.07	0.06	0.41	196	427	3	2
D-6	median	0.46	0.05	0.07	0.03	0.38	89	290	3	2
D-6	max	1.36	0.11	0.14	0.41	0.75	2200	> 2000	6	3
D-6	min	0.03	0.00	0.02	< 0.01	0.26	12	60	< 1	< 1
D-12A	average	1.99	0.04	0.10	0.09	0.65	154	400	8	3
D-12A	median	2.02	0.03	0.10	0.07	0.72	85	250	7	3
D-12A	max	3.03	0.12	0.18	0.36	1.29	1100	> 2000	42	10
D-12A	min	1.05	0.01	0.04	< 0.01	0.08	12	24	1	< 1
Main Drain 1/4 Mi u/s Snake R	average	0.32	0.04	0.10	0.06	0.59	263	636	34	11

Table 2.6-2. Minidoka Irrigation District Drain Water Quality.

Sample ID	Analysis Method	NO3/NO2 mg/L	Ortho-P mg/L	T-Phos mg/L	NH3 mg/L	TKN mg/L	Fecal ct/100mL	Totals ct/100mL	Suspended Solids mg/L	Turbidity NTU
Main Drain 1/4 Mi u/s Snake R	median	0.30	0.04	0.08	0.04	0.57	220	520	14	6
Main Drain 1/4 Mi u/s Snake R	max	0.79	0.14	0.31	0.16	1.80	1100	2300	264	61
Main Drain 1/4 Mi u/s Snake R	min	0.05	0.01	0.02	< 0.01	0.28	20	60	< 1	2
ALL DRAINS 1996-2001	average	1.58	0.05	0.09	0.06	0.49	169	441	10	4
	median	0.88	0.04	0.08	0.04	0.46	90	290	4	2
	max	7.98	0.26	0.31	0.41	1.80	2200	5800	264	61
	min	0.01	0.00	0.01	0.01	0.08	10	2	1	2

Note: Ortho-P = Ortho-Phosphorous; T-Phos = Total Phosphorous; NH_3 = Ammonia; TKN = Total Kjeldahl Nitrogen; NTU = nephelometric turbidity units

Source: Compilation of available data by CH2M HILL.

Table 2.6-3. Water Quality Characteristics of Drainwater on the Minidoka North Side Pumping Division (1981-1992).

	Standards/Criteria			Drainwater Concentrations		
Parameter[1]	**Drinking Water**	**Aquatic Life[2]**	**Irrigation Water[3]**	**No. of Samples**	**Range**	**Mean[4]**
Electrical Conductivity (µS/cm)	—	—	750[5]	1021	6—1079	638
Turbidity (FTU)	—	—	—	1127	1—1400	66
Nitrate + Nitrate -N (mg/L)	10	—	—	986	0.1—10.0	2.0
Arsenic, Total	50	850	100	41	1—20	6
Boron	—	—	750	43	20—580	188
Cadmium, Total	5	3.9	10	77	<1—<2	1
Chromium, Total	100	16	100	77	<1—<26	6
Copper, Total	1000	18	200	77	<1—<28	6
Iron, Total	3000[6]	—	5000	77	60—20,300	2930
Lead, Total	15	82	5000	77	1—23	7
Lithium, Total	—	—	75	73	25—85	44
Manganese, Total	50[6]	—	200	77	2—645	100
Mercury, Total	2	2.4	—	78	<0.2—1.0	0.24
Selenium, Total	50	20	20	37	<1—2	2
Zinc, Total	5000	120	2000	77	1—132	30
Total Coliform Bacteria (counts/100 mL)	<1	—	—	888	5—34,000	1843
Fecal Coliform Bacteria (counts/100 mL)	<1	—	4000	888	<2—9,000	251

[1]Units are micrograms/liter except where noted: mS/cm = microsiemens per centimeter; mg/L = milligrams per liter; NTU = Nephelometric Turbidity Units; mL = milliliters
[2]EPA aquatic life criteria used by U.S. Fish and Wildlife Service in the 1991 Minidoka North Side Contaminants Assessment
[3]Adapted from Water Quality Criteria for Agriculture, Environmental Protection Agency (1972)
[4]Mean of samples exceeding detection limits
[5]Problems for sensitive crops such as beans
[6]Secondary standards

Source: Reclamation 1993.

concentrations in A&B are higher than MID. No significant concentrations of nitrates or trace elements have been found to date.

Results of drain water monitoring indicate that return flows entering project injection wells commonly exceed the Safe Drinking Water Act maximum contaminant level for coliform bacteria and turbidity. Because of the generally poor biological and physical quality of irrigation return flows, continued injection of untreated wastewater could potentially impact points of diversion for domestic use in the project area, and could contribute to contamination of the Snake River Plain Aquifer.

As noted, Reclamation has historically injected these drain waters back into the shallow groundwater aquifer. However, concerns over contamination of this aquifer with poor quality water have led to efforts to close the injection wells. In order to get rid of the irrigation runoff, Reclamation and the irrigation districts have constructed a series of artificial wetlands; the main purpose of which is to allow and facilitate evaporation and evapotranspiration of irrigation drain water. Secondary benefits of the constructed wetlands include wildlife habitat and potential water quality improvement.

In 1992, a research and demonstration project to evaluate the use of wetland systems for irrigation drainwater management was initiated at the end of the H Main Drain under Reclamation's wetlands program. Preliminary study results based on 2 years of monitoring by Reclamation indicated a net decrease in suspended solids. There are currently 11 drain water wetlands totaling about 218 acres and ranging in size from about 5 to 44 acres. Consolidation of injection wells and the construction of evaporation wetlands have allowed 51 injection wells to become inactive or capped, leaving 27 in operation in 2003 within A&B. The intent is to close all drain wells by the end of calendar year 2006.

2.7 Vegetation

Historically, the vegetation on uplands within and surrounding the RMP Study Area consisted of shrub-steppe habitat (Tisdale and Hironaka 1981). Shrub-steppe habitats in western North America are characterized by woody, mid-height shrubs, perennial bunchgrasses, and forbs (Daubenmire 1978, Dealy et al. 1981, Tisdale and Hironaka 1981, Short 1986). Periodic drought, extreme temperatures, wind, poor soil stability, and only fair soil quality (Wiens and Dyer 1975, Short 1986) create a stressful environment for biotic communities. The original shrub-steppe vegetation of the RMP Study Area was dominated by big sagebrush (Artemisia tridentata) with an understory of native perennial grasses and forbs, consisting mainly of bluebunch wheatgrass (*Agropyron/ Pseudoroegneria spicatum*), Sandberg's bluegrass (*Poa secunda*), needlegrasses (*Stipa* spp.), lupine (*Lupinus* spp.), Indian paintbrush (*Castilleja* spp.), and penstemon (*Penstemon* spp.) (Hironaka et al. 1983) (See Photo 2-6). As shown on Figure 2.7-1, most of the original

Photo 2-6. Portion of a parcel made up of mainly good shrub-steppe habitat.

Insert Figure 2.7-1.

Back of Figure 2.7-1.

bunchgrass-sagebrush communities in the vicinity of the RMP Study Area have been replaced by irrigated agriculture and pasture or are dominated by exotic species that have become established as a result of human disturbance, livestock grazing, and a higher fire frequency compared to pre-European settlement.

Currently, most of the lands within the RMP Study Area have been converted to irrigated agriculture. Remaining native vegetation exists primarily on RMP Study Area parcels that are interspersed within farmland. The western-most Reclamation parcels have the most remaining native sagebrush-grassland with native understory species of bunchgrasses and forbs (see Photo 2-7), while the eastern parcels generally have had more disturbance and are dominated by rabbitbrush (*Chrysothamnus* spp.) and cheatgrass (*Bromus tectorum*) (see Photo 2-8). In some areas, protection from fire, coupled with heavy and prolonged livestock grazing, have resulted in sagebrush stands with an impoverished understory. With forb and grass depletion, biodiversity values are lost and the ability to withstand weed invasion decreases as well. Therefore, many sagebrush stands have an understory of exotic annuals dominated by cheatgrass. Cheatgrass enables a regime of frequent fires, which removes sagebrush cover and perpetuates cheatgrass dominance on these sites. Five major vegetation cover types were identified in the Study Area during vegetation mapping conducted in 2002 (Table 2.7-1, Current Vegetation on Minidoka North Side Parcels):

- Sagebrush or shrub-steppe
- Grasslands
- Wetlands
- Playas
- Forested areas

Photo 2-7. Rock outcropping surrounded by sagebrush and bunchgrasses.

Photo 2-8. Many of the parcels show signs of degradation as typified in this photo (e.g., ORV use, over-grazing, and noxious weeds).

The shrub-steppe cover type on the west side of the RMP Study Area is dominated by big sagebrush. Rabbitbrush is scattered throughout all sites but is dominant mostly on the eastern parcels. Several internally drained basins contain silver sagebrush (*Artemisia cana*) as the dominant shrub, with lesser amounts of three-tip sagebrush (*A. tripartita*). These sites tend to have a sparse understory. There are also scattered stands of winterfat *(Ceratoides lanata*), which is rarely observed in this geographic region. Sites that have been protected from livestock grazing for several years and have not burned recently contain a variety of native grasses and forbs mixed with cheatgrass. These sites are typical of the shrub-steppe that are in relatively good range condition. Some of the native plants found in these areas are Sandberg's bluegrass, squirreltail (*Sitanion hystrix*), bluebunch wheatgrass, western wheatgrass (*Agropyron smithii*), basin wildrye (*Elymus cinereus*), needlegrass, Indian ricegrass (*Oryzopsis hymenoides*.), lupine, penstemon, phlox (*Phlox hoodii*), paintbrush, death camas (*Zigadenus* spp.), larkspur (*Delphinium* spp.), and gooseberryleaf globemallow (*Sphaeralcea grossulariifolia*) (see Photo 2-9).

Wooded areas are defined by the presence of trees, whether native or invasive. The native species, Rocky mountain juniper (*Juniperus scopulorum*), is only found in a few areas along the Snake River.

Photo 2-9. Lupine, globe mallow, and bunch grasses.

Russian olive (*Elaeagnus angustifolia*), an aggressive exotic tree that displaces native species, is taking on a dominant role along the water's edge of most of the wooded parcels along the Snake River.

Table 2.7-1. Current Vegetation on Reclamation Parcels in the Minidoka North Side RMP Study Area.

Cover Type	Existing Habitat Value[a]	Approximate Total Acres (Hectares)
Sagebrush Habitat		
Sagebrush: Low Cover (<25% sagebrush cover and <60 cm tall)	Medium	400 (162)
Sagebrush: Medium-Low Cover (<25% sagebrush cover and >60 cm tall)	Medium	2,251 (911)
Sagebrush: Medium Cover (>25% sagebrush cover and <60 cm tall)	Medium-High	2 (1)
Sagebrush: High Cover (>25% sagebrush cover and >60 cm tall)	High	2,082 (843)
Grasslands		
Annual Grassland	None	7,054 (2,855)
Crested Wheat Grasslands	Low	842 (341)
Perennial Grassland	Low-Medium	876 (342)
Agriculture	None	864 (350)
Wetland	Low-High	321 (130)
Disturbed	None	91 (37)
Playas	Low	1 (<1)
Wooded	Medium-High	30 (12)
Unsurveyed	Unknown[b]	2,892 (1,207)
Total Acres (Ha)		17,706 (7,165)

[a]Based upon amount and number of native species present and amount of canopy structural diversity. [b]Generally, unsurveyed parcels likely have low habitat value because they are small and subject to disturbance and weed invasion

Source: Vegetation mapping conducted by CH2M HILL in 2002.

Disturbed areas were dominated by either the non-native grasses listed under grassland (Table 2.7-1) or by non-native forbs. Forbs on disturbed sites include tumble mustard (*Sisymbrium altissimum*), bur buttercup (*Ranunculus testiculatus*), prickly lettuce (*Lactuca serriola*), goatsbeard (*Tragopogon* spp.), and pepperweed (*Lepidium perfoliatum*). These weedy and exotic forbs also are typical of the herbaceous cover found on disturbed areas.

The annual grassland cover type is dominated by cheatgrass with few forbs or other grasses. The cheatgrass-dominated areas are a result of increased fire frequency depressing the competitive ability of native vegetation. Some areas designated as grasslands were seeded with the non-native perennial grass crested wheatgrass (*Agropyron cristatum*). These areas were distinguished from native perennial grasslands dominated by native grass species because they lack structural diversity and have few, if any, forbs or other plant species that would make them as valuable to wildlife as the native perennial grassland species. Basin wildrye, a large native bunchgrass, occurs in limited areas on wetter sites such as the lower ends of irrigated fields and adjacent to irrigation canals.

Irrigation of RMP Study Area lands results in irrigation drain water that must be disposed. Reclamation and the irrigation districts have constructed a series of artificial wetlands, to dispose of irrigation runoff (see Photo 2-10). There are 11 drain water wetlands, totaling about 218 acres and ranging in size from about 5 to 44 acres. Other wetlands on the RMP Study Area are generally small, scattered, and usually associated with irrigation water runoff. In addition to the drain water wetlands, these other wetlands cover slightly more than 100 acres. Three wetland types are present: scrub shrub, emergent, and open water (Cowardin et al. 1979). Scrub shrub wetlands are dominated primarily by willows (*Salix* spp.). Emergent wetlands are dominated by cattails (*Typha* spp.) and bulrush (*Scirpus* spp.). The open water wetlands include stock ponds and drain water areas with no wetland vegetation.

Playas are unique natural areas where water collects temporarily following larger rain events. However, the water does not remain long enough to support wetland plants. There are several playas within some sagebrush-dominated parcels on the western side of the RMP Study Area.

Photo 2-10. Typical artificially constructed wetland.

These playas are very rare, contain an uncommonly seen plant, combleaf (*Polyctenium fremontii*), and often contain large areas of soil covered by a cryptogramic or biological soil crust, consisting of cyanobacteria, green algae, lichens, mosses, and/or microfungi. Such crusts protect the soil surface from wind and water erosion by binding the soil surface together and also facilitate rain water percolation into the upper soil horizon.

Agricultural lands are comprised mostly of row crops, small grains, and hay. The primary irrigated crops are alfalfa, beans, corn, peas, potatoes, small grains, and sugar beets.

2.7.1 Weed Infestations

Weeds are an important issue across all land uses and cover types. Their presence on agricultural land can decrease harvest potential and increase the cost of farming. Their presence in areas with native plant cover decreases habitat values. Weed species are especially dominant where ground disturbance has occurred and along roads. Some areas are relatively weed free, especially on the larger western parcels where native species dominate and human-related disturbance within the parcels is relatively low. Cheatgrass is the most widespread weed. Bur buttercup is also ubiquitous on most areas with any sort of disturbance. Other weeds that are most often encountered are Canada thistle (*Circium arvense*), bull thistle (*Circium vulgare*), tumble mustard, bulbous bluegrass (*Poa bulbosa*), and kochia (*Kochia scoparia*).

2.7.2 Rare and Sensitive Species

Rare and sensitive species listed by the FWS as occurring in one or more of the counties in which the RMP Study Area occurs and that may be present in the Study Area are listed in Table 2.7-2. Expected presence in the Study Area is based on habitat suitability, known distribution, Idaho Conservation Data Center (CDC) information, and published literature.

2.8 Wildlife

In 1989, the FWS completed a study of wildlife and wildlife habitat on a portion of Reclamation withdrawn lands in the Minidoka North Side RMP Study Area (FWS 1989). The study was conducted to prepare a wildlife habitat management plan for parcels within the proposed Minidoka North Side Extension project. That project was not completed. However, data collected on the Reclamation parcels in the RMP Study Area provide the most comprehensive discussion of wildlife and wildlife habitat for the RMP Study Area. Information presented in that report (FWS 1989) was supplemented with information from Reclamation and IDFG biologists, Reclamation GIS files, published and unpublished literature, Idaho CDC data, and observations by CH2M HILL biologists. The FWS (1989) study focused on 73 of the 113 withdrawn parcels. There are only a few major habitat types on the parcels and within each type there is little variation, suggesting that the results of the FWS study broadly apply to all of the withdrawn lands and the surrounding agricultural lands. Information from FWS (1989) has been updated in those instances where more current data are available.

Table 2.7-2. Rare and Sensitive Plant Species Listed by FWS for Counties in RMP Study Area.

Species	Potential Occurrence by County[a]			Known Status in RMP Area
	CAS	JER	MIN	
Goose Creek milkvetch *(Astragalus anserinus)*	X			Barren slopes with substrate of white volcanic sand. Unlikely in the RMP area.
Davis' wavewing *(Cymopterus davisii)*	X			Alpine and subalpine slopes, ridges, and summits with calcareous or dolomitic soils. Not expected in the RMP area.
Idaho penstemon *(Penstemon idahoensis)*	X			Utah juniper, bitterbrush and bluebunch wheatgrass with volcanic outcrops. Possible, but unlikely in the RMP area.

[a]Counties: CAS=Cassia; JER=Jerome; MIN=Minidoka

Source: Compilation of on habitat suitability, Idaho CDC information, and published literature by CH2M HILL.

Historically, the vast Snake River Plain, on which the RMP Study Area is located, was covered by shrub/steppe vegetation dominated by sagebrush and a wide variety of bunch grasses and forbs. Habitat value of the original shrub/steppe for wildlife has been substantially reduced and degraded by agricultural and related development, which eliminated most of the original habitat and fragmented much of what remains within predominantly agricultural areas. Remaining habitats have been further degraded by grazing and noxious weed invasion.

While the Reclamation parcels have been fragmented and degraded as described, they do represent the only remnants of native vegetation within a much larger area of irrigated lands served by the Minidoka project, and thus, those parcels that support native vegetation still do have value for wildlife. The highest wildlife habitat values are generally associated with the largest parcels supporting native vegetation. The parcels also provide virtually the only permanent cover for wildlife over a large expanse.

Wildlife using the RMP Study Area lands are generally restricted to species tolerant of the interspersed sagebrush cropland habitat. Removal of native vegetation and plant structural diversity, through overgrazing and fire, has reduced the abundance and diversity of wildlife (Kindschy 1978, McAdoo and Klebenow 1979, Ryder 1980). Reclamation ended grazing on most of the parcels in 1998, allowing some recovery of native grasses and forbs. However, no quantitative studies or inventories to document vegetation changes on these lands have been conducted.

Big game species on the project area include a few mule deer (*Odocoileus hemionus*) and pronghorn (*Antilocarpa americana*). Some mule deer are resident and others are migrant. In recent years, the number of migrant mule deer has increased to a few hundred deer during severe winters. Fires occurring north of the project area have destroyed winter range, apparently forcing mule deer south onto the Minidoka North Side area (FWS 1985). The loss of native shrublands from fire and past conversion to agriculture has reduced and degraded mule deer winter range, resulting in increased depredations on private lands (FWS 1985, Reclamation 1986).

Large fur bearing mammals occurring in upland parts of the Study Area include coyote (*Canis latrans*), red fox (*Vulves vulpes*), badger (*Taxidea taxus*), and striped skunk (*Mephitis mephitis*). Raccoons (*Procyo lotor*), muskrats (*Ondatra zibethica*), long tailed weasels (*Mustela frenata*), and mink (*Mustela vison*) occur on parcels along the Snake River or those containing larger wetlands or canals. Small mammals common to the area include black tailed jackrabbits (*Lepus californicus*), montane voles (*Microtus montanus*), and deer mice (*Peromyscus maniculatus*).

Some of the conspicuous nongame birds breeding on parcels with native vegetation include common nighthawks (*Chordeiles minor*), western kingbirds (*Tyrannus verticalis*), sage thrashers (*Oreoscoptes montanus*), loggerhead shrikes (*Lanius ludovicianus*), and Brewer's sparrows (*Spizella breweri*).

More than 230 species of birds have been observed at the Minidoka NWR since 1950, according to FWS (2002). The more common breeding raptors are northern harrier *(Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), and burrowing owl (*Athene cunicularia*). Less common raptors that are present during migration or summer include prairie falcon (*F. mexicanus*), Swainson's hawk (*B. swainsoni*), ferruginous hawk (*B. regalis*), turkey vulture (*Cathartes aura*), short eared owl (*Asio flammeus*), and great horned owl (*Bubo virginianus*). The most abundant wintering raptors are the rough legged hawk (*Buteo lagopus*), red tailed hawk, and prairie falcon. Northern goshawks (*Accipiter gentilis*), may be present in the winter, especially near the Snake River, and golden eagles (*Aquila chrysaetos*) may also be present during winter.

As discussed in Section 2.7, Vegetation, Reclamation and the irrigation districts have constructed a series of artificial wetlands; the main purpose of which is to facilitate evaporation and evapotranspiration of irrigation drain water. There are 11 drain water wetlands totaling about 218 acres and ranging in size from about 5 to 44 acres. Other wetlands on the RMP Study Area are generally small, scattered, and usually associated with irrigation water runoff. In addition to the drain water wetlands, these other wetlands cover slightly more than 100 acres. Vegetation cover associated with these drain water wetlands varies considerably. The larger drain water wetlands provide the most valuable wildlife habitat.

The larger wetlands provide feeding and resting habitat for migrating waterfowl as well as some nesting habitat (see Photo 2-11). No surveys have been conducted to document wildlife use. However, it is likely that several of the species that are common to abundant at the Minidoka NWR would also use the larger drain water wetlands at times. The Minidoka NWR bird lists (FWS 2002 and 1989) indicate that the waterfowl species most likely to use Study Area wetlands and nearby grain fields include mallards (*Anas platyrhynchos*), gadwalls (*A. strepera*), and cinnamon teal (*A. cyanoptera*). Fewer numbers of redheads (*Aythya americana*), ruddy ducks (*Oxyura jamaicensis*), pintails (*Anas acuta*), American wigeon (*Anas americana*) and northern shovelers (*Anas clypeata*) breed in the refuge area and may occasionally use drain water wetlands. Wintering waterfowl include Canada geese (*Branta canadensis*), mallards, pintails, gadwalls, American wigeon, northern shovelers, and green winged teal (*Anas crecca*). Tundra swans (*Cygnus columbianus*) forage in grain fields in relatively low numbers during migration.

Photo 2-11. Waterfowl take flight from one of the larger artificially constructed wetlands.

Great blue herons (*Ardea herodias*), American avocets (*Recurvirosta americana*), long billed curlews (*Numenius americanus*), killdeer (*Charadrius vociferous*), and other shorebirds would also be expected to use the larger wetlands, as would red-winged blackbirds (*Agelaius phoeniceous*).

Historically, Minidoka County had some of the highest densities of pheasants in Idaho (Thomas 1985, FWS 1985). The pheasants reached peak densities between 1955 and 1965. The increase in grain production—in combination with weedy areas along canals, roadside vegetation, spoil areas, and interspersion of remaining sagebrush lands—created excellent habitat for pheasants (Reclamation 1986). In recent years, however, pheasants have declined drastically (Rybarczyk and Connelly 1985). Much of the decline is due to loss of permanent and carry-over wintering and nesting habitat that resulted from changes in farming practices. Conversion of rangelands to agriculture, and more efficient and intensive farming, has resulted in larger farms, loss of roadside cover, removal of riparian vegetation, increased use of herbicides and insecticides, and burning of fence rows and ditch banks. Croplands are usually fallow during fall and winter, making waste grain unavailable as a pheasant food source. In addition to clean farming practices, human-caused and wild fires have converted sagebrush to annual grasslands, destroying valuable winter and escape cover for pheasants.

In addition to pheasants, other upland game species in the Study Area include gray partridge (*Perdix perdix*), mourning dove (*Zenaida macroura*), Nuttall's cottontail (*Sylvilagus nuttallii*).

Amphibians and reptiles expected to occur include long toed salamanders (*Ambystoma macrodactylum*), Pacific treefrogs (*Hyla regilla*), western chorus frogs (*Pseudacris triseriata*), longnose leopard lizards (*Gambelia wislizenii*), side blotched lizard (*Uta stansburiana*), racers (*Coluber constrictor*), gopher snakes (*Pituophis melanoleucus*), garter snakes (*Thamnophis* spp.), and western rattlesnakes (*Crotalus viridis*).

The Snake River immediately downstream of Minidoka Dam is included in the RMP Study Area. Most of the wildlife species noted as using wetlands and river side parcels would be expected in this area. In addition, white pelicans (*Pelicanus erythrohynchus*) and several species of gulls use the area just below the dam during the summer.

Executive Order 13186 defines the responsibilities of Federal agencies to protect migratory birds under the four Migratory Bird Treaties (MBT Conventions) to which the United States is a signatory. Most birds in North America are considered migratory under one or more of the MBT Conventions. The Executive Order mandates that all Federal agencies cooperate with the FWS to increase awareness and protection of the nation's migratory bird resources. Each agency is required to develop an MOU with FWS stating how it intends to cooperate. Reclamation is in the process of finalizing an MOU with FWS, which includes provisions for analyzing Reclamation's effect on migratory birds.

2.8.1 Rare and Sensitive Species

Rare and sensitive species listed by the FWS as occurring in one or more of the counties in which the RMP Study Area occurs and that may be present in the Study Area are listed in Table 2.8-1. Expected presence in the Study Area is based on habitat suitability, occurrence in similar habitats at the nearby Minidoka NWR, and published literature including Groves et al. (1997). Other rare or sensitive species listed by the FWS for these counties, but that are not expected to occur in the RMP Study Area, are not included in Table 2.8-1. With few exceptions, there are no data regarding the occurrence of rare and sensitive species or their habitats on Reclamation parcels.

Table 2.8-1. Rare and Sensitive Wildlife Species Listed by FWS for Counties in RMP Study Area Containing Reclamation Parcels.

Species	Potential Occurrence by County[a] CAS	JER	MIN	Known Status in RMP Area
Mammals				
Yuma myotis *(Myotis yumanensis)*				Often associated with water, ranges throughout southern Idaho. Likely near the Snake River and possible drain water wetlands.
Long-eared myotis *(Myotis evotis)*	X			More common in forested areas but may be present in riparian habitat along the Snake River
Western small-footed myotis *(Myotis ciliolabrum)*	X			Occurs in arid areas especially associated with cliffs; this habitat occurs on some of the western parcels along the Snake River
Townsend's big-eared bat *(Corynorhinus townsendii)*	X			Occurs throughout southern Idaho in shrub/steppe, among other habitats. Suitable habitat on larger parcels of native habitat.
Birds				
Columbian sharp-tailed grouse *(Tympanuchus phasianellus)*				Not likely in the RMP parcels but there has been a lek on the Minidoka NWR just east of the RMP Study Area since 1998.
Greater sage-grouse *(Centocercus urophasianus)*	X	X	X	Sign observed at one of the western parcels and suitable, but not high quality habitat present
Trumpeter swan *(Cygnus buccinator)*	X		X	Occasional at Minidoka NWR so possible, though rare, on larger Study Area drain water wetlands
Northern goshawk *(Accipiter gentilis)*	X			Present along the Snake River, especially during winter and migration. Expected along the Snake River parcels with trees.
Ferruginous hawk *(Buteo regalis)*	X			Suitable foraging habitat present on the Study Area and on the Minidoka NWR
Black tern *(Chlidonias niger)*	X			Migrates through the Minidoka NWR for a brief period in September, so could occur at the larger drain water wetlands. Has not nested at the Minidoka NWR and is unlikely to nest at the drain water wetlands because of limited habitat.
Long-billed curlew *(Numenius americanus)*	X	X	X	Likely present, and may nest, especially near larger wetland areas
Western burrowing owl *(Speotyto cunicularia hypugaea)*	X			May be present, uncommon on the Minidoka NWR
Invertebrates				
Idaho Dunes tiger beetle *(Cicindela arenicola)*			X	Known to be present on at least one parcel

Table 2.8-1. Rare and Sensitive Wildlife Species Listed by FWS for Counties in RMP Study Area Containing Reclamation Parcels.

Species	Potential Occurrence by County[a]			Known Status in RMP Area
	CAS	JER	MIN	
Amphibians and Reptiles				
Northern leopard frog *(Rana pipiens)*	X	X	X	Likely present near wetlands and along the Snake River; fairly common around Lake Walcott.
Common garter snake *(Thamnophis sirtalis)*	X	X	X	Likely present along the Snake River, canals and drains, and drain water wetlands
Short-horned lizard *(Phrynosoma douglassi)*	X	X	X	Likely present on some larger parcels with native vegetation; have been observed by FWS on the Minidoka NWR.

[a]Counties: CAS=Cassia; JER=Jerome; MIN=Minidoka

Source: Compilation of available data by CH2M HILL.

2.9 Aquatic Biology

The Snake River below Minidoka Dam near Burley is predominantly a good quality fishery when water conditions are optimal (Personal Communication, Doug Megargle, May 29, 2003). The fishery is directly affected by seasonally fluctuating water levels and flows, and its quality typically deteriorates during dry periods. Poor water quality conditions are predominantly caused by irrigation return flows, high water temperatures, and algal blooms (ibid.). Water quality issues are exacerbated during periods of minimal flow.

The fishery is important to some and contains trophy size trout, but is generally considered to be a moderate use area for sport fishing (ibid.). Trout and bass are the main game species present in the Snake River below Minidoka Dam and fishing is permitted all year. Although some parts of the Snake River are stocked, this reach supports a self-sustaining trout population and is not supplemented (ibid.). This trout population is often affected by fluctuating water levels and flows, thriving during good water years and declining during dry periods (ibid.). Trout species found in this area include rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*), cutthroat trout (*Oncorhynchus clarki*), and rainbow trout—cutthroat trout hybrids (IDFG 2001).

Warm water game fish species present in this area of the Snake River include largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), bluegill (*Lepomis macrochirus*), brown bullhead (*Ameiurus nebulosus*), channel catfish (*Ictalurus punctatus*), and yellow perch (*Perca flavescens*) (IDFG 2001). The bass population, which is also self-sustaining, is more successful at maintaining itself and is less affected by poor quality water conditions than the trout population.

The only aquatic habitat present on the Study Area parcels are the drain water wetlands created to evaporate irrigation drain water. These are temporary in nature and only exist when there is excess irrigation drain water. The temporary nature of these wetlands prevents their use by all aquatic species except perhaps a few frogs and aquatic insects.

2.9.1 Rare and Sensitive Species

No state sensitive fish or other aquatic species were identified as occurring within the Snake River immediately below Minidoka Dam (IDFG 2003 and FWS 2003a) and none occur on any of the parcels. Three snail species listed as Federally threatened or endangered and occurring within Minidoka and Cassia Counties are addressed in Section 2.10, Threatened, Endangered, Candidate, and Proposed Species.

2.10 Threatened, Endangered, Candidate, and Proposed Species

The RMP Study Area is located within parts of four counties. This area also includes a limited number of plant communities and cover types, compared to the wide variety of these present in the four counties. Topographic variation within the RMP Study Area is also limited compared to that of these four counties. The FWS web site for Idaho (FWS 2003a) lists all of the listed, proposed, and candidate species for each of the counties. These species are listed in Table 2.10-1, along with information regarding the species' known or expected status within the RMP Study Area. Species that are known or expected to occur in the Study Area or that occur near the Study Area are discussed below. Threatened and endangered species, listed by the ESA, along with candidate and proposed species that do not occur in the Study Area, are only discussed in Table 2.10-1. Expected presence in the Study Area is based on habitat suitability, occurrence in similar habitats at the nearby Minidoka NWR, and published literature including Groves et al. (1997).

2.10.1 Wildlife

Bald Eagle

Bald eagles were listed as endangered on March 11, 1967 (32 Federal Register [FR] 4001). The recovery of the species allowed a reclassification to threatened on July 12, 1995 (60 FR 35999-36010). Bald eagles are closely associated with lakes and large rivers in open areas, forests, and mountains. They nest near open water in late-successional forest with many perches or nest sites, and low levels of human disturbance (McGarigal 1988, Wright and Escano 1986). The nest site is usually within one quarter to 1 mile of open water with less than 5 percent of the shore developed within 1 mile. Perches are generally at the edge of forest stands, near foraging areas, or near the nest tree and have panoramic views of surrounding areas. They need large trees along rivers with good visibility, preferably snags, for perching. Protected deep ravines with large trees are often used as night roosts. Critical winter habitat is located near food sources, such as lakes, rivers, and uplands with big game winter range. These sites have adequate perch sites and sheltered roost sites. Human activity may be a major factor limiting bald eagle distribution on wintering habitats (Steenhof 1976).

One pair of bald eagles nest on the Minidoka NWR (Personal Communication, Steve Bouffard, June 16, 2003). There are typically 10 to 20 bald eagles along the Snake river within the refuge during the winter until the water freezes. When the reservoir freezes, the eagles at the west end of the reservoir move downstream below the dam, where they continue to feed on waterfowl and fish. They generally roost in large cottonwoods. Bald eagles would not be expected to use any of the parcels that are

Table 2.10-1. Threatened and Endangered Species, Proposed Species, Candidate Species, and Species Petitioned for ESA Listing for Counties in RMP Study Area Containing Reclamation Parcels.

Species[a]	Potential Occurrence by County[b]			Expected or Known Status in RMP Area
	CAS	JER	MIN	
Listed Species				
Mammals				
Canada lynx (LT) *(Lynx canadensis)*	X			No suitable habitat present in RMP area or on adjacent lands
Gray wolf (XN) *(Canis lupus)*	X	X	X	No suitable habitat present in RMP area or on adjacent lands
Birds				
Bald eagle (LT) *(Haliaeetus leucocephalus)*	X	X	X	Present along the Snake River especially during winter and spring migration; no known nests in the RMP Study Area
Invertebrates				
Bliss Rapids snail (LT) *(Taylorconcha serpenticola)*	X	X	X	Occurs downstream of RMP Study Area reach of the Snake River—see text
Snake River physa snail (LE) *(Physa natricina)*	X	X	X	Occurs downstream of RMP Study Area reach of the Snake River—see text
Utah valvata (LE) *(Valvata utahensis)*	X	X	X	Possible, though not expected in RMP Study Area reach of the Snake River—see text.
Fish				
Bull trout (LT) *(Salvelinus confluentus)*				Not present in the Study Area reach of the Snake River
Plants				
Ute ladies'-tresses (LT) *(Spiranthes diluvialis)*	X	X	X	Not expected to occur on RMP lands that are not adjacent to the Snake River because these wetlands did not exist before project implementation and were created as a result of the project and irrigation. Wetlands on the few parcels along the Snake River have a low potential for Ute ladies'-tresses.
Proposed/Candidate Species				
Birds				
Yellow-billed cuckoo (C) *(Coccyzus americanus oxidentalis)*	X	X	X	Suitable riparian habitat may exist along the Snake River
Amphibians				
Spotted frog (*Rana luteiventris)*	X	X	X	Does not occur in this portion of southern Idaho (Groves et al. 1997)

Table 2.10-1. Threatened and Endangered Species, Proposed Species, Candidate Species, and Species Petitioned for ESA Listing for Counties in RMP Study Area Containing Reclamation Parcels.

Species[a]	Potential Occurrence by County[b] CAS	JER	MIN	Expected or Known Status in RMP Area
Mammals				
Pygmy rabbit (PE) *(Brachylagus idahoensis)*	X	X	X	Possibly seen on one of the parcels. Pygmy rabbits, active burrows, and fresh sign observed on two parcels in 2003. Suitable habitat may be present on several other parcels.
Plants				
Christ's paintbrush (*Castilleja christii*)	X			This rare paintbrush covers approximately 200 acres near the summit of Mount Harrison on the Sawtooth National Forest. This is the only known population in the world (Moseley 1996). It does not occur in the RMP Study Area.

[a]Species: C = Candidate; P= Proposed for listing by FWS; LE = Listed endangered; LT = Listed threatened;
XN = Experimental/non-essential population; PE Petitioned for listing under ESA
[b]Counties: CAS=Cassia; JER=Jerome; MIN=Minidoka

Source: FWS 2003 and compilation of available data by CH2M HILL.

not located immediately adjacent to the Snake River. Parcels along the river would only be used if there are large trees suitable for perching and if these trees are located near areas that support suitable and accessible prey species including fish or waterfowl.

Yellow-billed Cuckoo

A petition to list this species was filed in 1998. The petitioners stated that "habitat loss, overgrazing, tamarisk invasion of riparian areas, river management, logging, and pesticides have caused declines in yellow-billed cuckoo." In the 90-day finding published on February 17, 2000 (FR 65[33]: 8104 8107), FWS indicated that these factors may have caused loss, degradation, and fragmentation of riparian habitat in the western United States, and that loss of wintering habitat may be adversely affecting the cuckoo. The yellow-billed cuckoo has status as a Candidate species for protection under the ESA. In July 2001, FWS announced a 12-month finding for a petition to list the yellow-billed cuckoo as threatened or endangered in the western United States. As of June, 2003, this species continues to have Candidate status (67 FR 4065740679).

This secretive bird is a neotropical species that breeds in North America and winters primarily south of the U.S.-Mexico border. Cuckoos may go unnoticed because they are slow-moving and prefer dense vegetation. In the West, they favor areas with a dense understory of willow (Salix spp.) combined with mature cottonwoods (Populus spp.) and generally within 100 meters of slow or standing water (Gaines 1974; Gaines 1977; Gaines and Laymon 1984). They appear to be dependent on the combination of a dense willow understory for nesting and a cottonwood overstory for foraging. The yellow-billed cuckoo is also known to use non-riparian, dense woody vegetation at times but these habitats are not preferred (Finch 1992; DeGraff et al. 1991). It feeds on insects, mostly caterpillars, but also beetles, fall webworms, cicadas, and fruit (especially berries). Populations seem to fluctuate dramatically in response to fluctuations in caterpillar abundance. These fluctuations are erratic, but not necessarily cyclic (Kingery 1981).

Most Idaho records are of isolated, non-breeding individuals (FWS 1985). Although occasional reports of this bird are noted, including several birds at Lawyers Creek in Lewis County in 1979 and six at Cartier Wildlife Management Area in 1980, no nesting attempts or young have been observed and breeding populations of yellow-billed cuckoos in Idaho are believed to be extirpated (Reese and Melquist 1985). Suitable habitat for the cuckoo exists in the more dense riparian stands along the Snake River within the RMP reach, some of which may occur on a few of the parcels bordering the river. None of the upland parcels provide suitable cuckoo habitat.

Pygmy Rabbit

The FWS was petitioned to list the pygmy rabbit as a threatened or endangered species throughout its range on April 14, 2003. Pygmy rabbits are uniquely dependent on sagebrush, which comprises up to 99 percent of its winter diet. It is one of only two North American rabbits that digs its own burrows. It is a strict sagebrush obligate, inhabiting sagebrush dominated habitats in the Intermountain Region and Great Basin. The historical range of the pygmy rabbit encompassed more than 100 million acres in 8 western states, including Idaho. Pygmy rabbits are one of a very few species, including pronghorn antelope and sage grouse, that can ingest large amounts of sagebrush leaves laden with terpenoids without major digestive disturbances and death (White et al. 1982, Katzner 1994).

This combination of small body size, specialized feeding strategies, and unique habitat requirements are unusual among leporids. Pygmy rabbits have the greatest surface area to volume ratio (and thus heat loss) of any rabbit species in their known geographic range and endure harsh climatic extremes characterized by cold winters and dry summers where drought is common (Katzner 1994).

The pygmy rabbit is an extreme habitat specialist at all levels, from the landscape level to placement of burrows and use of surrounding areas (Gabler 1997, Heady 1998, Heady et al. 2001). It is closely associated with native sagebrush stands, including clumps of tall dense sagebrush coupled with deep loose textured soils for burrow construction. Herbaceous vegetation is also important to pygmy rabbits (Lyman 1991), which augment their sagebrush diet with forbs and grasses. Pygmy rabbits choose tall dense sagebrush for their burrows. Wisdom et al. (2000) assumed that this vegetation cover, which provides protection from predators, is important and that areas of bare ground would be avoided. Burrows are typically occupied by one individual that has particular feeding use areas. It is found in aggregations or colonies in areas of suitable habitat.

Pygmy rabbits are slow and vulnerable to predators in open areas. They elude predators by maneuvering in dense shrub cover (66 FR 231). Big sagebrush provides both essential year-round food and critical protection from predation. Habitat fragmentation readily isolates populations, as disruptions in sage brush cover and open areas provide barriers to dispersal. The pygmy rabbit has very limited dispersal abilities and is reluctant to cross open areas, amplifying the effects of fragmentation.

A possible pygmy rabbit sighting was noted by CH2M HILL biologists on one of the Reclamation parcels during vegetation mapping in the fall of 2002. Pygmy rabbits, active burrows, and fresh sign were seen at two locations on one of the larger parcels in the western third of the Study Area during surveys conducted by a Reclamation biologist in 2003. Habitat on some of the larger Reclamation parcels that support predominantly native vegetation may also be suitable for pygmy rabbits but has not been searched. As noted above, movement across agricultural or cheatgrass areas between parcels of suitable habitat is unlikely. Therefore, any larger parcels that contain occupied or suitable habitat is very important to pygmy rabbits. Pygmy rabbits present on the parcels would likely be isolated from other Reclamation parcels or larger blocks of suitable habitat on BLM lands to the west and north.

2.10.2 Fish and Other Aquatic Species

No Federally-listed proposed, candidate, threatened or endangered fish species were identified as occurring within the Snake River immediately below Minidoka Dam (IDFG 2003 and FWS 2003a).

Three snail species are listed as Federally threatened or endangered and occur within Minidoka and Cassia Counties. The listed species include the Bliss Rapids snail (*Taylorconcha serpenticola*), Federally threatened; the Utah valvata snail (*Valvata utahensis*), Federally endangered; and the Snake River physa snail (*Physa natricina*), Federally threatened (FWS 2003b). Remnant snail populations inhabit a small fraction of their historical range, and mostly exist near springs and other high quality water areas of the Middle Snake River with free-flowing, cool water. In 1992, the FWS reported known and suspected Utah valvata snail populations near Lake Walcott and near Burley, respectively, and suspected Snake River physa populations near Lake Walcott (Reclamation 1998a). More recent distribution estimates described in the FWS Snake River Aquatic Species Recovery Plan (1995) and by the FWS (2003b) for each of the identified snail species are as follows:

- Bliss Rapids snail—Found in the main stem of the Snake River from King Hill to Banbury Springs, Idaho, well downstream of the RMP Study Area, and in several unpolluted springs adjacent to the Snake River, including Thousand Springs, Banbury Springs, Box Canyon Spring, and Niagra Springs.

- Snake River physa snail—Found only at a few main stem Snake River locations, mostly in the Hagerman and King Hill reaches, which are also well downstream of the Study Area, with possibly a third colony immediately downstream of Minidoka Dam where live specimens were collected in 1987.

- Utah valvata snail—Found only in a few springs and mainstem sites from American Falls Reservoir to the Hagerman Valley, Idaho, including immediately downstream and upstream (in Lake Walcott) of Minidoka Dam, which includes the Study Area reach of the Snake River.

These three snail species are typically associated with free-flowing, cool water environments, which have been greatly modified in the Snake River (FWS 1995). However, as noted above, both the Utah valvata snail and Snake River physa snail are reported to occur immediately downstream of Minidoka Dam (FWS 1995), while the Utah valvata snail is reported to occur throughout Lake Walcott, which is not considered cool or free-flowing water according to the FWS. The snails are vulnerable to continued adverse habitat modification and deteriorating water quality from one or more of the following:

hydroelectric development, peak-loading effects from existing hydroelectric project operations, water withdrawal and diversions, water pollution, and inadequate government regulatory mechanisms (Reclamation 1998a).

2.10.3 Plants

Ute Ladies'-tresses Orchid

The Ute ladies'-tresses orchid (*Spiranthes diluvialis*) is the only Federally protected plant species that may occur in or near the Snake River in the RMP Study Area. It typically occupies floodplains and wet meadows with little overhanging shrub or tree canopy. Wetland and riparian habitats such as springs, wet meadows, and point bars within river meanders are potential habitat. Ute ladies'-tresses orchids have been found in southeast Idaho and eastern Washington and may occur in suitable habitats between these locations. The most suitable potential tress habitat would occur in riparian communities along the Snake River. Wetlands within the Minidoka North Side area that are not adjacent to the Snake River would probably not be considered as potential habitat because these areas were only developed recently. No searches for this species have been conducted on Reclamation lands.

2.11 Cultural Resources

Evidence of human occupation in south-central Idaho dates as early as 14,500 years before the present (B.P.). The three major prehistoric cultural periods that have been identified for southeastern Idaho also apply to south central Idaho:

- Early Prehistoric Period (15,000 to 7,500 B.P.)
- Middle Prehistoric Period (7,400 to 1,300 B.P.)
- Late Prehistoric Period (1,300 to 150 B.P.)

These periods reflect a shift over time from a highly mobile lifestyle involving hunting and gathering (such as seeds, roots, mammals, and fish), to reduced mobility and intensified use of certain highly productive resources (such as camas and salmon). Many archaeological sites near the Minidoka North Side RMP Study Area have yielded diagnostic artifacts, indicating that the Study Area was occupied or used during all three prehistoric periods.

The Study Area is within the Snake River Basin, which was traditionally used by the Shoshone and Bannock Tribes for gathering plants for food and medicine, hunting, fishing, trading, and for ceremonial purposes. The Shoshone and Bannock Tribes of the Fort Hall Reservation, Idaho, represent two linguistically distinct populations of people. The length of time these tribes have occupied southern Idaho is a subject of long-standing debate among scholars. Subsistence practices and lifestyles were similar to other Great Basin cultural groups. Because the environment could not sustain large populations, people moved from one resource to the next, relying on a wide variety of resources, including roots, berries, nuts, marmots, squirrels, rabbits, insects, large game, and fish. By the time of the earliest Euroamerican contact in the early 1800s, the Shoshone and Bannock Tribes had acquired the horse, making it easier to procure bison and other resources, and to trade.

The earliest Euroamericans in south-central Idaho came to develop the fur trade, to convert the Native Americans, or to explore and survey the region. The major east-west travel route of these early explorers passed through the (now) Minidoka North Side RMP Study Area along the Snake River. Portions of the route later became the Oregon Trail, first used by emigrants in 1841. Settlement of south-central Idaho began in the 1870s, mainly associated with the expansion of Mormon communities out of Utah. The arrival of the railroad in the early 1880s was crucial to the development of southeastern Idaho, with several Union Pacific branch lines created in what is now the Study Area. Agriculture served as the primary economic activity in late 19th and early 20th centuries, and irrigation systems were of signal importance to that development. In 1894, Congress passed the Carey Act to encourage state and private cooperation in developing irrigated agriculture, and 8 years later it created the Reclamation Service to federalize irrigation in the west. One of the earliest Federal reclamation projects in Idaho, the Minidoka Project of 1904, provided for the construction of Minidoka Dam in 1904 to 1906, and other dams in the region, as well as thousands of miles of canals, laterals, and drains.

Indian relationships with Euroamericans deteriorated as the number of emigrants and settlers increased in the middle and late 1800s. Treaties with the United States Government in 1863 and 1868, and establishment of the Fort Hall Reservation in 1867, confined the Shoshone-Bannock and opened the area for Euroamerican settlement. Continuing hostilities, however, led to military action by the U.S. Government, including the Bannock War of 1878. Following the Bannock War, Congress reduced the area of the Fort Hall Reservation several times.

A total of 132 cultural resource sites (including isolates) within the boundaries of the Minidoka North Side Study Area have previously been filed on forms at the Idaho State Historic Preservation Office (SHPO). The sites include 47 archaeological sites, 78 historic structures or features, and 7 sites of undetermined chronology or affiliation. Other cultural resource sites have been identified but not formally recorded within the boundaries of the Study Area. Those sites are not included in this count of cultural resource sites.

Most of the archaeological sites are deposits of prehistoric artifacts, usually obsidian, ignimbrite, and cryptocrystalline silicate (chert, jasper, or chalcedony) flakes produced in tool manufacture. Sometimes these artifacts are found in association with other stone tools (for example, bifaces, hammerstones, scrapers, and metates), pieces of animal bone, or ceramic potsherds. Prehistoric site types in the Study Area include open sites (lithic scatters), rock shelters, and stacked rock features (including cairns, possible hunting blinds, and wall structures of undetermined function). Diverse cultural activities and widespread use of the project area in prehistoric times is reflected in the range of site types, site location/environmental association, and variability in site size. Excavations at archaeological sites near the Minidoka North Side Study Area (but not in the Study Area) contain cultural deposits that provide circumstantial evidence for intensive prehistoric use of the Study Area over time.

The historic period sites recorded in the Study Area represent a wide variety of resources related to transportation (ferries, roads, bridges, and railroads), irrigation (dams, canals, and buildings), gold mining (placer mines), and residential activities (town sites, a work camp, trash scatters and dumps, buildings, foundations, and a cemetery).

A Class I inventory of existing information for the Minidoka North Side RMP Study Area characterizes lands administered by Reclamation as rich in cultural and paleontological resources. Of the cultural sites known in the Study Area, those listed in Table 2.11-1 are considered eligible for the National Register of Historic Places (National Register). These sites (as well as other sites that remain to be identified and evaluated for the National Register) have the potential to address research questions or to offer vital information about the prehistoric or historic use of the Study Area.

Tribal members are reluctant to provide specific information about locations where traditional artistic, economic, or other cultural practices were conducted within the Study Area. However, certain natural resources within the Study Area are still used by Shoshone-Bannock Tribal members, although access to these resources has been restricted by historical and modern development, especially development related to irrigation and agriculture. Resources identified include round rocks found near the river for use in sweats and other ceremonies; pine nuts, chokecherries, sagebrush and roots used for food, medicine, and trading; animals such as deer and groundhog used for food and clothing; and fish, especially from the Snake River, for food.

The potential for encountering fossils in the Minidoka North Side Study Area is high in areas of Snake River alluvium (sands, gravels, and lake beds). All of the vertebrate fossils found to date on or near the Study Area were discovered during construction of the Minidoka Dam and gravel quarrying along the Snake River. These well-preserved fossils include many classic extinct animals from the late Pleistocene, including camels, musk ox, horses, mammoth, and ground sloth. Well-preserved paleontological faunas could also occur in some basalt flows on the northern margin of the Study Area.

2.12 Indian Sacred Sites

Sacred sites are defined in EO 13007 as "any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian Tribe, or an Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion..." Under EO 13007, Federal land managing agencies must accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, and avoid adversely affecting the physical integrity of such sacred sites.

No information on specific sacred properties or locations within the Minidoka North Side Study Area has been provided by tribes. Nevertheless, certain ceremonial activities and practices with possible sacred or religious components continue to occur in the RMP Study Area. Within the Study Area, for example, Shoshone-Bannock tribal members collect rocks for ceremonial purposes. Various natural and physical features that may be present on the Study Area landscape—such as foothills, buttes, springs, lakes, and rivers—derive their sacredness and power from a natural undisturbed state. In addition, certain cultural sites may be regarded as sacred to tribes, including, for example, burial places, petroglyph and pictograph sites, important travel routes, and battle or massacre sites, among others.

Table 2.11-1. Cultural Sites that are Eligible for the National Register of Historic Places.

Identification Number	Description	Identification Number	Description
10CA630	prehistoric lithic scatter	00-078	historic "North Side Canal"
10CA653	historic "H" Canal	10MA19	historic dump
10CA654	historic "J" Canal	10MA20	historic dump
10CA655	historic "G" Canal	10MA21	historic dump
10CA862	historic "Oregon Trail" South Side Alternate	10MA24	historic dump
10CA873	historic "Milner Lowlift Canal"	10MA27	historic dump
10JE47	prehistoric rock shelter—ARPA Site	10MA33	prehistoric lithic scatter
10JE54	prehistoric lithic scatter—"Twin Lakes Site"	10MA41	prehistoric lithic scatter
10JE57	historic dump	10MA44	prehistoric lithic scatter
10JE59	historic "Stage Road"	10MA49	historic camp—"Walcott Park"
10JE60	prehistoric lithic scatter—"Duck Rock Site"	10MA144	historic "Oregon Short Line"
10JE62	prehistoric lithic scatter—"Dike 3 Site"	67-554	historic "Minidoka Dam and Powerplant"
10JE77	prehistoric lithic scatter	10TF463	historic "Oregon Trail"
10JE79	prehistoric lithic scatter	10TF1105	historic "Milner"
10JE81	prehistoric lithic scatter	10TF1106	historic/prehistoric multi-component—"Alveolus Site"
10JE82	prehistoric lithic scatter	10TF1135	historic "Oregon Trail at West Milner"
10JE113	prehistoric lithic scatter	10TF1279	historic "Milner Lowlift Canal"
10JE146	historic "Oregon Short Line"	10TF1280	historic "Twin Falls Main Canal"
01-1302	historic "Sprague House"	83-772	historic "Milner Dam"

Source: Compilation of data from Reclamation cultural resources reports, including Ozbun et al. 2000.

2.13 Indian Trust Assets

ITAs are legal interests in property held in trust by the United States for Indian tribes or individuals. The Secretary of the Interior, acting as the trustee, holds many assets in trust for Indian tribes or Indian individuals. Examples of things that may be trust assets are lands, minerals, hunting and fishing rights and water rights. While most ITAs are on-reservation, they may also be found off-reservation.

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

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

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

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

The Northwestern Band of the Shoshone Indians, a Federally recognized Tribe without a reservation, possess treaty protected hunting and fishing rights which may be exercised on unoccupied lands within the area acquired by the United States pursuant to the 1868 Treaty of Fort Bridger. No opinion is expressed as to which areas maybe regarded as "unoccupied lands."

Other Federally recognized Tribes that do not have off-reservation ITAs, may however have cultural and religious interests in the areas being considered in the RMP. These interests may be protected under historic preservation laws and NAGPRA. See Sections 2.11, Cultural Resources, and 2.12, Indian Sacred Sites, for a discussion of other Tribal interests.

2.14 Socioeconomics

Most of the Reclamation parcels are found in Minidoka County, although some of the largest parcels are located in Jerome County. Eight parcels are also located in Cassia County. This region includes the communities of Burley, Heyburn, Paul, Acequia, Rupert, Minidoka, and Declo. Distribution of Reclamation lands by jurisdiction, area, and parcel is presented in Table 2.14-1.

Table 2.14-1. Minidoka North Side Land Distribution Summary.

County	Parcels	% of Total	Acres	% of Total
Minidoka	92	77.31	9,732.8	55.05
Jerome	19	15.97	6,598.5	37.32
Cassia	8	6.72	1,348.4	7.63
Total	**119**	**100**	**17,679.7**	**100**

Source: U.S. Bureau of Reclamation GIS Data.

2.14.1 Economy and Employment

The region's economy is largely dependant on farming and food processing. Dominant commodities include potatoes, sugar beets, beans, corn, grains, dairies, and others. A number of large food processors convert these to commodities such as sugar, frozen french fries, and cheese. Together, Minidoka, Jerome, and Cassia Counties contribute approximately two-thirds of the region's labor force. In 2003, both Minidoka and Cassia Counties had unemployment rates significantly higher than the surrounding region or the state of Idaho, while Jerome County's unemployment rate was just slightly above the regional average. Labor force and unemployment data are summarized in Table 2.14-2.

The state of Idaho has traditionally lagged behind the national average in terms of both per capita income and income growth. Likewise, the three-county area surrounding the Study Area tended to lag behind the state in terms of per capita income, even though income growth exceeded the State's. In 1979, Minidoka and Jerome Counties had roughly comparable per capita incomes trailing behind Cassia County's. Jerome and Cassia Counties now have comparable per capita incomes with the State, however Minidoka County continues to trail its two neighbors. Changing per capita income is compared in Table 2.14-3.

2.14.2 Population and Demographics

Together, the three counties comprising the Study Area contribute 4.6 percent of the state's population. However, if recent trends continue, this percentage will decline, because the average population growth in Idaho has easily outpaced even the fastest growing of the three counties (Jerome) and greatly exceeded the slowest (Minidoka).

Table 2.14-2. 2003 Annual Average Labor Force and Employment Summary.

Area	Civilian Labor Force	Unemployment	% Unemployment	Total Employment
Minidoka County	9,709	802	8.3	8,907
Jerome County	10,114	416	4.1	9,698
Cassia County	9,935	659	6.6	9,276
Magic Valley LMA	54,248	2,173	4.0	52,075
State of Idaho	692,552	37,447	5.4	655,104

Source: Idaho Department of Labor, 2004.

Although relatively diverse, all three counties are dominated ethnically by white persons. Other than this majority, the only considerable ethnic group is persons of Hispanic or Latino origin who comprise more than one-fourth of Minidoka County's population and substantial segments of the other two counties as well. Census data from 2000 are presented for the three counties and the state of Idaho in Table 2.14-4.

Table 2.14-3. Comparative Per Capita Income Summary.

Per Capita Income	1979	1984	1989	1994	1998	2002	% Change from 1998
Minidoka County	$6,107	$8,553	$12,114	$15,054	$16,669	$19,664	18.0
Jerome County	$6,087	$9,346	$14,083	$17,349	$22,702	$24,787	9.2
Cassia County	$6,707	$10,535	$14,736	$16,538	$19,923	$24,324	22.1
State of Idaho	$7,894	$11,069	$14,803	$18,846	$22,079	$25,476	15.4
United States	$9,230	$13,824	$18,566	$22,581	$27,203	$30,906	13.6

Source: Idaho Department of Labor 2004.

Table 2.14-4. Comparative Demographic Data Summary.

Population Data	Minidoka County	Jerome County	Cassia County	State of Idaho
Population 2003	19,349	18,913	21,610	1,366,332
Population, percent change, April 1, 2000 to July 1, 2003	-41%	3.1%	0.9%	5.6%
Population, 2000	20,174	18,342	21,416	1,293,953
Population, percent change, 1990 to 2000	4.2%	21.2%	9.6%	28.5%
White persons, percent, 2000 (a)	78.1%	87.0%	84.7%	91.0%
Persons reporting some other race, percent, 2000 (a)	17.8%	9.8%	12.1%	4.2%
Persons reporting two or more races, percent, 2000	2.5%	1.9%	1.9%	2.0%
Persons of Hispanic or Latino origin, percent, 2000 (b)	25.5%	17.2%	18.7%	7.9%
Median household income, 1999 model-based estimate	$32,021	$34,696	$33,322	$37,572
Persons below poverty, percent, 1999 model-based estimate	14.8%	13.9%	13.6%	13.0%
Children below poverty, percent, 1997 model-based estimate	20.6%	20.5%	20.4%	17.3%

(a) Includes persons reporting only one race
(b) Hispanics may be of any race, so also are included in applicable race categories
Source: U.S. Census Bureau 2004.