Section 3
Environmental Analysis

3.1 INTRODUCTION

The area of interest for the focused environmental analysis presented in the SEIR is the "brine pool transition area" which is the portion of the Owens Lake bed located south of the vegetated portion of the Owens River Delta, including the northeastern portion of the brine pool that is influenced by outflows from the Owens River Delta (see **Figure 3-1**). The project component relevant to the focused environmental analysis is the operation of the proposed pump station, which would change the quantity and timing of Lower Owens River flows that reach the brine pool transition area as compared with existing conditions. The focus of the analysis for this SEIR is the potential impacts on biological resources, particularly birds and their habitat, of the brine pool transition area that would result from this hydrologic change.

3.2 ENVIRONMENTAL SETTING

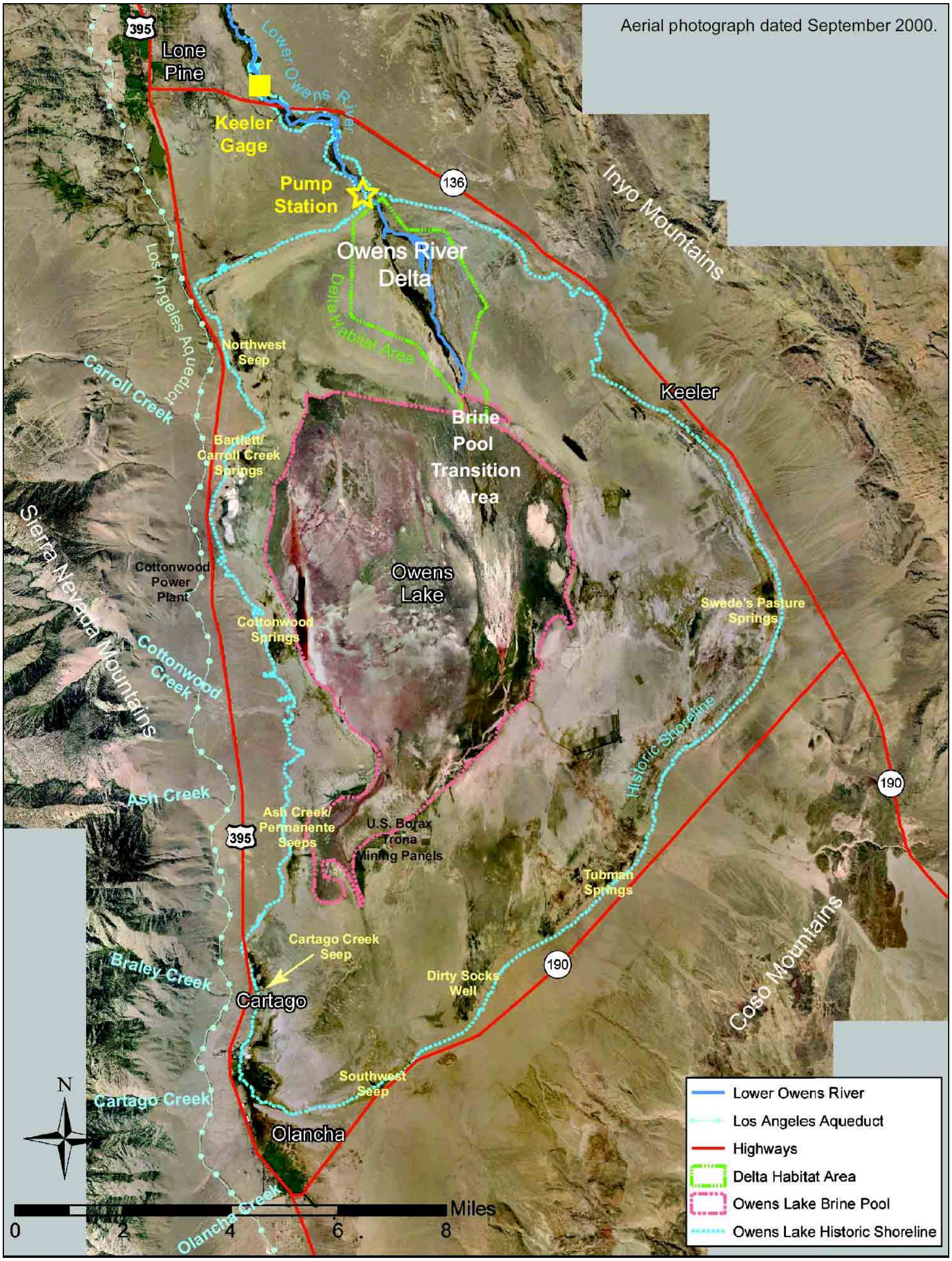
3.2.1 General Environmental Setting

The Owens Lake is located at the terminus of the Lower Owens River and at the southern end of the Owens Valley, approximately 200 miles north of Los Angeles (see **Figures 2-1** and **2-2**). The Owens Valley is a north-south trending valley located in Inyo County, California, and is bounded by the Sierra Nevada Mountains to the west, Inyo and White Mountains to the east and Coso Mountains to the south. Major roads in the vicinity of the Owens Lake include U.S. Highway 395 to the west, State Highway 136 to the northeast, and State Highway 190 to the southeast (see **Figure 3-1**). The Los Angeles Aqueduct, which approximately parallels U.S. Highway 395, is located to the west of the lake. Communities (unincorporated Inyo County) in the vicinity include Lone Pine (to the northwest), Keeler (to the east), Cartago (to the southwest), and Olancha (to the southwest).

In pre-historic times, the Owens Lake had a maximum elevation of 3,880 feet above mean sea level (msl) and overflowed to the south through Rose Valley and into China Lake (GBUAPCD, 1997; GBUAPCD, 2003). By approximately 3,000 years ago, however, natural geologic and climatic processes (uplifting of the Coso Mountains and the post-glacial drying trend) eliminated the outflows, turning the Owens Lake into a terminal lake (GBUAPCD, 2003). By the late 1800s, Owens Lake had an elevation of approximately 3,600 feet msl, and due to evapoconcentration of naturally-occurring minerals and salts dissolved in the water, was about 1.5 times as saline as seawater (GBUAPCD, 2003).

Since the late 1800s, surface water diversions from the River (initially for agriculture and later for water supply to the City of Los Angeles) have substantially reduced inflows to the Owens Lake. As a result, the water surface area of the lake decreased substantially, and the lake was virtually dry by 1930 (GBUAPCD, 2003). As the lake dried up, dissolved minerals and salts in the water crystallized into a salt crust, covering much of the lake bed.

Figure 3-1
Owens Lake and Vicinity



Today, the Owens Lake bed is delineated by its historic shoreline at approximately 3,600 feet msl, which corresponds to approximately 110 square miles or 70,000 acres in surface area (GBUAPCD, 1997). The lake bed is nearly flat (see **Figure 3-2**). The lowest portion is located in the west-central part of the lake bed, and was reported in 1915 to be approximately 3,542 feet msl; however, the current lowest elevation is estimated to be higher due to subsequent deposition of salts (up to 8- to 9-feet thick) (GBUAPCD, 1997).

The lake bed is surrounded on the south, east and west by alluvial fans consisting of coarse-grained sediments transported from the surrounding mountains and deposited in a radial pattern from the mouths of the canyons (GBUAPCD, 1997; Danskin, 1998). To the north, the lake bed is bounded by fluvial and lacustrine deposits (Danskin, 1998). The lake bed is underlain by a sequence of clay deposits interbedded with several sand/gravel deposits (GBUAPCD, 1997). The sedimentary deposits of the lake bed are displaced by several faults that generally trend northwest-southeast (GBUAPCD, 1997).

Based on its hydrologic and biologic characteristics, areas of the Owens Lake bed can be classified into the following major categories (see **Figure 3-1**):

- **Playa areas –** The outer area of the lake bed between the historic shoreline (3,600 feet msl) and 3,553.5 feet msl is commonly referred to as the Owens Lake playa (GBUAPCD, 1997) and is a total of approximately 50,000 acres. The playa includes the following:
    - ☐ **Unvegetated Playa –** Prior to 2001, most of the playa areas were dry (except during extremely large storm events), largely unvegetated, and consisted of fine-grained exposed lake bed sediments, portions of which are covered with sand sheets and small sand dunes. Currently, over 12,000 acres of the playa are covered by shallow flooding and managed vegetation as part of the Owens Lake Dust Mitigation Program (see description below and **Section 3.2.2.2**).
    - ☐ **Owens River Delta**[1] – The Owens River Delta (Delta) is located at the terminus of the Lower Owens River and within the northern part of the playa. The Delta contains various riparian and wetland vegetation types that have developed on the playa over time and are supported by River flows. Based on an evaluation of aerial photographs taken in September 2000, the Delta included approximately 824 acres of wetland or riparian vegetation types (primarily alkali marsh and alkali meadow) and approximately 1,237 acres of upland vegetation types (primarily Parry saltbush) (LADWP, 2004a).
    - ☐ **Seeps and Springs –** In addition to the Delta, portions of the playa areas along the historic shoreline contain wetland vegetation supported by springs and seeps.
- **Brine Pool –** South of the Delta is the brine pool (approximately 20,000 acres), which is located on the west-central portion of the Owens Lake bed and below elevation 3,553.5 feet msl (designated as the ordinary high water mark by the U.S. Army Corps of Engineers) (GBUAPCD, 1997). The brine pool is a broadly concave area consisting of

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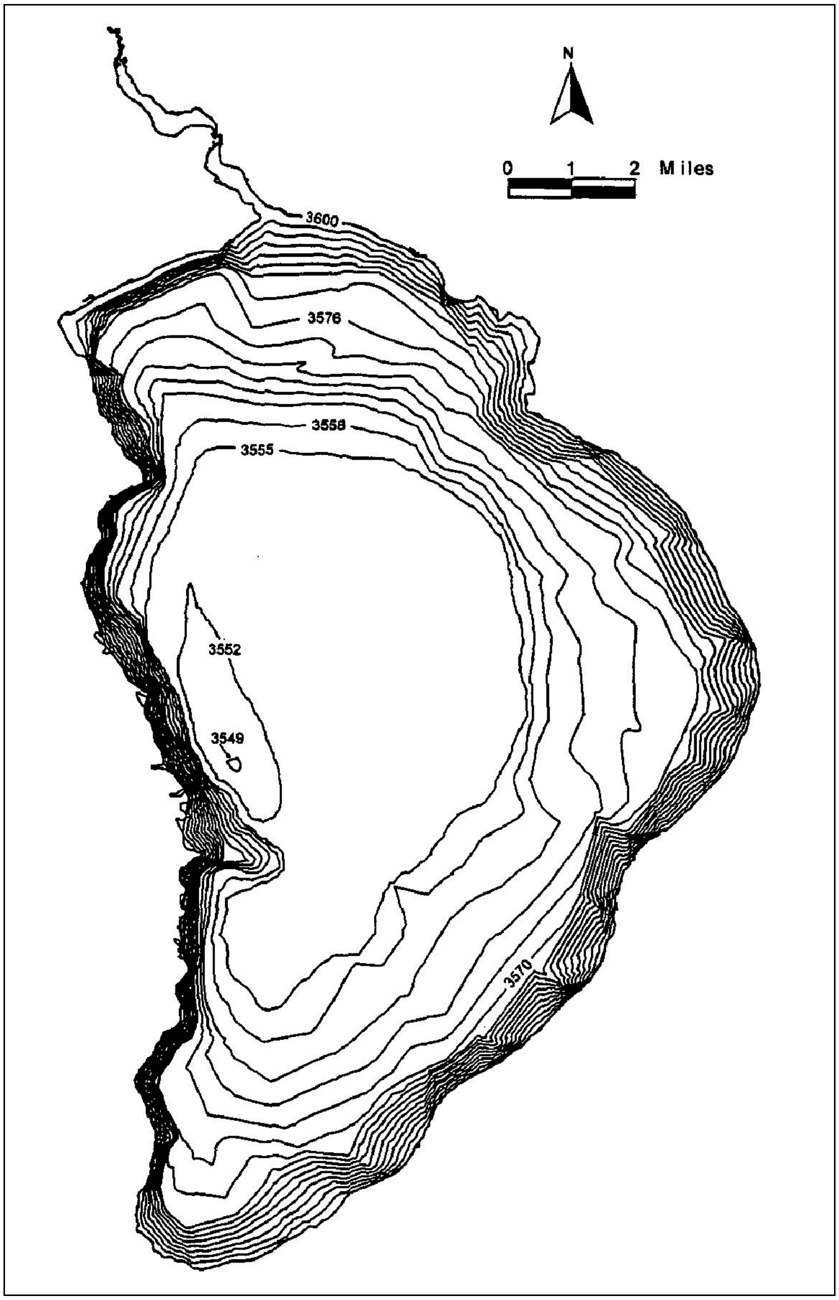
[1] The term “Delta Habitat Area” is used in the LORP Final EIR (LADWP, 2004a) for the purpose of defining the LORP project area. The “Delta Habitat Area” (a total of 3,578 acres) includes all of the vegetated portions of the Owens River Delta, some of the adjacent unvegetated playa areas and a small portion of the brine pool (see **Figure 3-1**). The Delta Habitat Area does not reflect the full extent of the area influenced by river outflows.

salt deposits and lake bed sediments. Vegetation is absent in the brine pool. Surface water is present year-round only in a small portion along the west flank of the brine pool (fed by Cottonwood Springs). Surface water can be present in the other portions of the brine pool, but the areal extent varies substantially (from none to covering the entire brine pool) on a seasonal basis and from year to year (see also **Section 3.2.2.2**).

Figure 3-2
Topographic Map of Owens Lake



Source: GBUAPCD, 1997.
Note: Contour interval is 3 feet. Developed from shallow piezometer monitoring network elevation data, satellite data, and Lee (1915; as cited in GBUAPCD, 1997).

Most of the Owens Lake bed is owned by the State of California and managed by the California State Lands Commission (SLC). Small portions of the lake bed are owned by the City of Los Angeles and private entities. Portions of the lake bed are leased by SLC and LADWP for grazing. In addition, U.S. Borax, Inc. leases approximately 16,120 acres (primarily in the brine pool area) from SLC for extracting trona (carbonate minerals) from the salt deposits on the lake bed (Inyo County, 2004a)[2].

Large portions of the playa areas have been leased to LADWP for implementation of the Owens Lake Dust Mitigation Program. Dust blowing from the Owens Lake bed is a major contributor to existing violations of federal and state air quality standards for particulate matter 10 microns or smaller in diameter (PM10) in the southern Owens Valley. In accordance with the State Implementation Plan (SIP) for the Owens Lake PM10 Planning Area prepared by the Great Basin Unified Air Pollution Control District (GBUAPCD) (prepared in 1998 and revised in 2003), LADWP has been implementing various measures to reduce dust emissions from the playa areas of the lake bed since January 2002. Dust control measures include the use of shallow flooding (applying water to the lake bed until it is either inundated with a few inches of water or the soil becomes saturated to the surface), managed vegetation (irrigated playa with saltgrass), and gravel layers (see **Figure 3-5**). Facilities constructed to implement the dust control measures include a pipeline system to convey water from the Aqueduct to the dust control areas, berms delineating the shallow flooding areas, and raised access roads.

The public has access to the lake bed for recreational uses, including bird watching and seasonal hunting (deer, waterfowl, tule elk and game birds); hunting takes place primarily in the Delta and in the southern portion of the lake bed near Cartago and Dirty Socks Well where game animals are present (GBUAPCD, 2003).

3.2.2 Water Resources

3.2.2.1 Precipitation and Evaporation/Evapotranspiration

The climate of the Owens Lake area is typical of the high desert, and is characterized by low humidity except during infrequent storms. Temperatures in the Owens Lake area range from approximately 18 to 70 degrees Fahrenheit (°F) during the winter and 45 to 103 °F during the summer (GBUAPCD, 1997). Temperatures are typically highest in July and August and lowest in December and January. High winds in the area can exceed average speeds of 40 mph as measured at a 33-foot height (GBUAPCD, 1997).

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[2] To prevent damage to the mineral deposits and facilities on the Owens Lake bed, a court injunction in 1950 originally prohibited the City of Los Angeles from diverting any water from its aqueduct system onto Owens Lake (People vs. City of Los Angeles, et al., 34 Cal.2d 695, 701; 214 P.2d 1., 1950). This injunction was modified in 2000 to specifically allow release of water onto Owens Lake as necessary for the purpose of implementing the LORP and the Owens Lake Dust Mitigation Program (People vs. City of Los Angeles, et al., Riverside Superior Court No. 34042, amended September 29, 2000). The modified injunction also requires the City of Los Angeles to: (1) notify SLC and the lessee, at least annually, of planned releases of water onto or into Owens Lake for the purpose of implementing the LORP and the Dust Mitigation Program, and (2) implement reasonable measures to avoid damage to the mining facilities and the mineral deposits.

Precipitation

Precipitation is monitored at several locations in the Owens Lake area, including LADWP's weather monitoring station in Lone Pine[3] and GBUAPCD monitoring stations located on the lake bed and its margin within or near the dust control project areas. Annual precipitation in the Owens Lake area varies substantially from year to year, ranging between less than 1 inch to approximately 10 inches. Average annual precipitation at the Lone Pine monitoring station for the period of record (from 1934/1935 to 2003/2004 water years[4]) is 3.8 inches; from 1990/1991 to 2003/2004 water years, the average was 4.0 inches per year, with most of the precipitation occurring between November and April (LADWP, 2005a). Average annual precipitation at the GBUAPCD monitoring stations ranged between 2 to 6 inches (for the 2 to 5 years of record at five stations known as A-tower, B-tower, Keeler, Mill, and Cartago; GBUAPCD, 2005). At higher elevations in the mountains surrounding the lake and the Owens Valley, average annual precipitation (both snow and rainfall) can be as high as 20 inches (GBUAPCD, 1997).

Assuming an average annual precipitation of 3.8 inches, direct precipitation onto the lake bed (approximately 70,000 acres) provides approximately 22,000 acre-feet per year of water on average. In terms of total volume, direct precipitation is the largest native source of freshwater input for the Owens Lake bed. However, except during large storm events, most of the precipitation falling on the lake bed is likely lost to evaporation and percolation, and does not result in surface runoff toward the brine pool. Direct precipitation onto the brine pool (approximately 20,000 acres) is estimated to be approximately 6,300 acre-feet per year on average.

Evaporation and Evapotranspiration

Evaporation and evapotranspiration from various types of surfaces present at the Owens Lake bed as described in the SIP EIR (GBUAPCD, 1997) are summarized in **Table 3-1**. This illustrates the wide range of evaporation and evapotranspiration rates.

3.2.2.2 Surface Water

Surface water inputs to the Owens Lake bed include direct precipitation, Lower Owens River flows, mountain streams, releases from nearby Aqueduct spillgates, seeps and springs, and water diverted from the Aqueduct and applied to the lake bed for dust control. The relative contributions of these different sources are summarized in **Table 3-2**. No surface outflows to the south (to Rose Valley) occur from the Owens Lake (GBUAPCD, 1997). Surface water features that drain into or are located within the lake bed are described below.

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[3] LADWP's monitoring station at Cottonwood Gates is closer to Owens Lake than Lone Pine in distance. However, precipitation measurements at Lone Pine (at 3,661 feet msl) are more representative of Owens Lake conditions since the Cottonwood Gates station is located at a much higher elevation (3,775 feet msl) than the Owens Lake (3,600 feet msl).

[4] A water year is defined as the one-year period that begins on October 1 and ends on September 30 – i.e., the 2000/2001 water year refers to period from October 1, 2000 through September 30, 2001.

Table 3-1
Estimated Evaporation and Evapotranspiration at Owens Lake

Type of Surface	Evaporation / ET Rate (inches/year)
Evaporation	
Playa areas with bare soil – Areas with thick sand deposits	3.4
Playa areas with bare soil – Areas dominated by clay/salt-crust	4.1
Open water areas of the brine pool – February - May	32.1
Open water areas of the brine pool – June - January	39.1
Evapotranspiration from Vegetated Areas	
Springs and Seeps	24.0 - 46.8
Owens River Delta (riparian and wetland vegetation)	30.0 - 60.0
Playa areas with sparse saltgrass (*Distichlis spicata* var. *stricta*)	8.4 - 15.6

Source: GBUAPCD, 1997. ET = evapotranspiration

Table 3-2
Summary of Surface Water Inputs to Owens Lake

Source and Summary Description	Approximate Average Annual Discharge* (acre-feet)
Direct Precipitation – Direct precipitation onto the lake bed provides approximately 22,000 acre-feet per year of water on average; however, most of the precipitation is likely lost to evaporation and percolation, and does not result in surface runoff toward the brine pool. (Direct precipitation onto the brine pool (approximately 20,000 acres) is estimated to be approximately 6,300 acre-feet per year on average.)	22,000
Lower Owens River – Since 1986, flows released from several Aqueduct spillgates to the lower portion of the River reach the lake bed and maintain the vegetation in the Owens River Delta. Outflows from the Delta toward the brine pool occur seasonally (typically from October/November through March/April).	8,000 at Keeler gage (located 4.5 river miles upstream of the LORP pump station site)
Dust Mitigation Program – Since operation began in 2002, water applied for dust control is the largest source of freshwater input onto the lake bed.	26,700
Seeps and Springs – Seeps and springs located along the lake margin support wetland vegetation and create outflow areas on the playa.	4,800
Mountain streams and Aqueduct spillgates – Intermittent flows, vary substantially seasonally and from year to year.	<1,000

* Sources for discharge data cited in text below and above in Section 3.2.2.1.

Lower Owens River and Owens River Delta

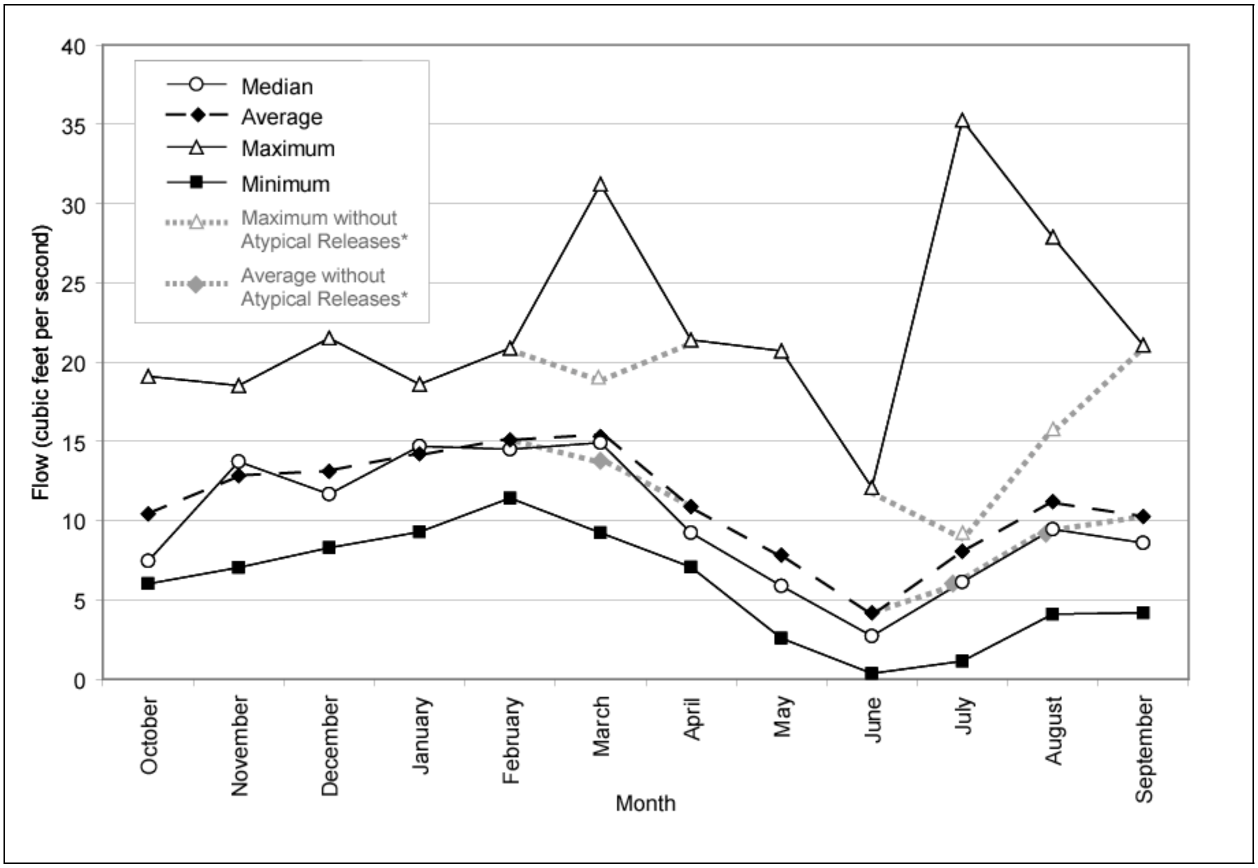
Under existing conditions, the River Intake structure (completed in 1913) impounds and diverts all of the Lower Owens River flows to the Los Angeles Aqueduct (except during extremely large storms). In the upper 24-river-mile portion (from south of the River Intake to just north of Mazourka Canyon Road), the River channel contains no flow under dry weather conditions except in rare instances of releases from the Aqueduct for maintenance or emergencies. In the lower 38-river-mile portion (from south of Mazourka Canyon Road to the historic shoreline of the Owens Lake), the channel contains flows released from several spillgates along the Aqueduct (see **Figure 2-2**) since 1986 as an Enhancement/ Mitigation project.

LADWP's Keeler gage, located just upstream of the State Route 136 crossing, is the only existing flow monitoring station on the River downstream of the River Intake (see **Figure 3-1**). Water flowing through the Keeler gage continues downstream toward the proposed LORP pump station and to the Delta. In the Delta, the River channel splits into two main branches (east and west), approximately 0.4 miles after the River crosses the historic shoreline of the Owens Lake. These two branches consist of braided channels, swales and pools with varying water depths (ranging from approximately 6 feet at the northern end to less than 1 inch at the southern end; LADWP, 2004a). The two branches converge approximately 4 miles southeast of the historic shoreline (approximately 0.6 miles north of the northern boundary of the brine pool) (see **Figure 3-1**). The amount of water from the Delta that reaches the brine pool varies seasonally and from year to year, as described below.

The Keeler gage is located approximately 4.5 river miles (approximately 2.5 linear miles) upstream of the proposed LORP pump station. Flow monitoring at Keeler gage began in 1927. Flow measurements for the past 15 years (i.e., since the 1990/1991 water year) are considered in the discussion below since this period is after commencement of the spillgate releases in 1986 and also coincides with the period when daily flow data have been tabulated from Keeler gage.

Figure 3-3 shows the average, median, minimum and maximum values of the monthly average flows measured at Keeler Gage from water years 1990/1991 to 2004/2005. As shown in **Figure 3-3**, flows at Keeler gage are typically highest from November through March and lowest from May through July. **Figure 3-4** shows the annual discharge at Keeler gage from water years 1990/1991 to 2004/2005; the average and median values for this period were 8,044 and 7,308 acre-feet per year, respectively (LADWP, 2005b).

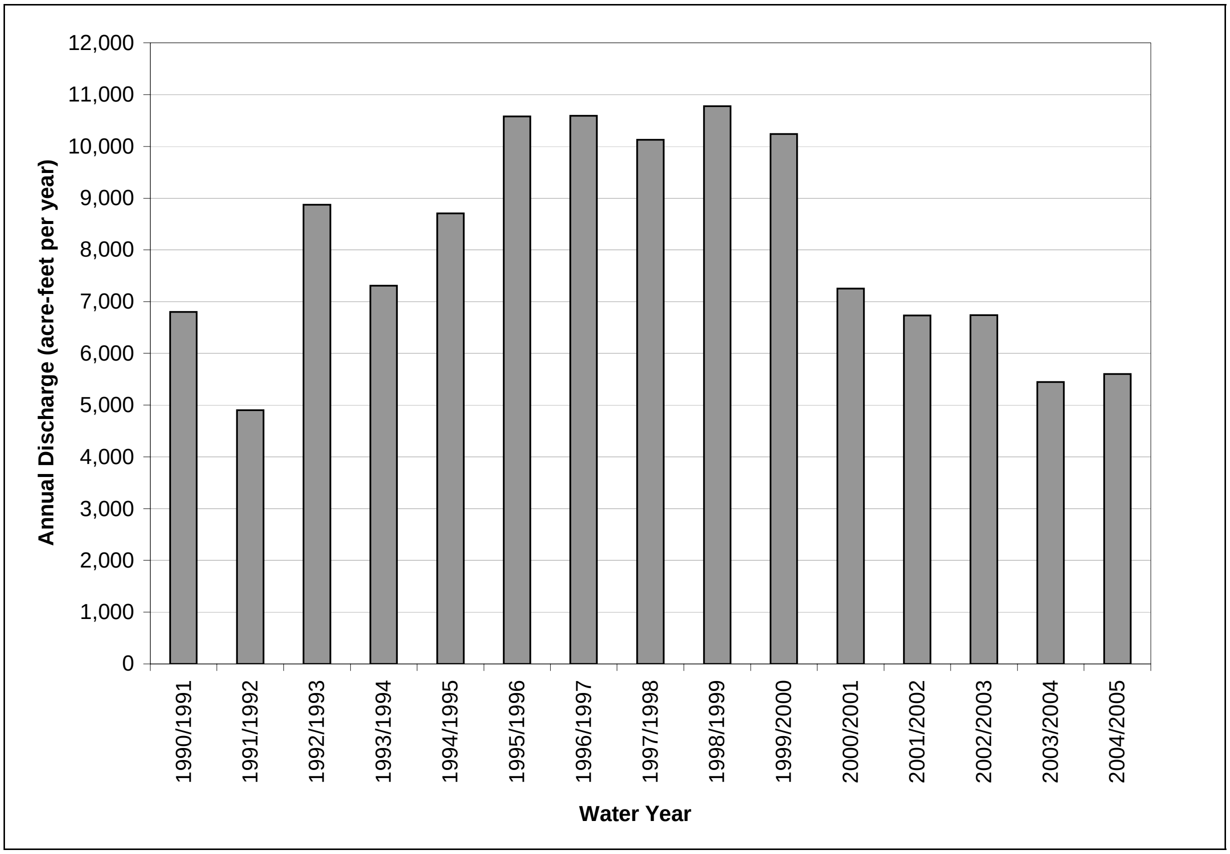
Figure 3-3
Monthly Flows at Keeler Gage – 1990/1991 to 2004/2005 Water Years



Source: LADWP, 2005b.

* Atypical releases included in the above graph include: (1) experimental releases from the River Intake in July and August of 1993 (up to 92 cfs daily average flow at Keeler gage) (described in Section 4.3.2 of the Final EIR; LADWP, 2004a); (2) an operations release from the Aqueduct to the River in March 1999 (up to 71 cfs daily average flow at Keeler gage); and (3) an emergency release from the Aqueduct to the River in August 2003 (up to 115 cfs daily average flow at Keeler gage). Without these atypical releases, the maximum flows for March, July and August would be 19, 9 and 16 cfs, respectively, and the average flows for July and August would be 14, 6 and 9 cfs, respectively.

Figure 3-4
Annual Discharge at Keeler Gage – 1990/1991 to 2004/2005 Water Years



Source: LADWP, 2005b.

Except for direct runoff during large storm events, there are no surface inflows into the River downstream of Keeler gage. Therefore, the flow reaching the brine pool is less than that measured at Keeler gage due to channel losses. Channel losses include evaporation from the water surface, evapotranspiration (defined as water evaporated from soils and wet plant surfaces and water transpired by vegetation present along the River channel downstream of Keeler gage and in the Delta) and percolation into the alluvial aquifer. It has been estimated that the channel loss rate between Keeler gage and the proposed pump station is approximately 0.35 cfs per mile (equivalent to approximately 1.6 cfs over the 4.5 river miles; LADWP, 2004a). The channel loss rate through the Delta has not been estimated, but is expected to be greater than 0.35 cfs per mile due to the more extensive vegetation in the Delta. The channel loss rate is expected to fluctuate seasonally (highest during the summer and lowest during the winter) due to varying evaporation and evapotranspiration rates throughout the year.

Because there are no existing flow monitoring stations located downstream of Keeler gage, the amount of Lower Owens River flow reaching the brine pool cannot be specifically quantified. However, based on review of remote imagery (see discussion below under the heading “Brine Pool Transition Area”), it is estimated that the outflows from the Delta toward the brine pool generally occur from October/November through March/April when flows at Keeler gage are typically highest and evaporation and evapotranspiration are lowest. From April/May through

September/October, there are typically no outflows from the Delta into the brine pool. Additional descriptions of the hydrologic conditions of the brine pool are provided below.

Sierra Nevada / Inyo / Coso Mountain Stream Flows and Aqueduct Spillgate

In addition to the outflows from the Delta, several streams perennially or periodically reach the Owens Lake bed as described below (see **Figure 3-1** for locations).

- **Sierra Nevada mountain streams:**
    - ☐ Carroll Creek, Cottonwood Creek, Ash Creek and Braley Creek. Under normal conditions, these perennial streams that collect runoff from the Sierra Nevadas are diverted entirely into the Aqueduct; however, when the Aqueduct is near or at capacity or is undergoing maintenance, some of the creek flow is directed over the Aqueduct and toward the western portion of the Owens Lake bed. Annual discharges from these creeks toward the Owens Lake bed from the 1990/1991 to 2003/2004 water years ranged from 0 to 667 acre-feet, with average and median values of 116 and 30 acre-feet, respectively (LADWP, 2005b). Except for Cottonwood Creek, flows released from these creeks mostly percolate into the alluvial fan before resulting in substantial surface runoff that reaches the brine pool.
    - ☐ Walker Creek, Olancha Creek and Cartago Creek. These Sierra Nevada streams typically do not discharge into Owens Lake due to diversion for irrigated agriculture in the Olancha-Cartago area and infiltration into the alluvial fan (GBUAPCD, 1997). Discharges from these creeks to the southern portion of the Owens Lake bed may occur in extremely wet years, but are not monitored.
- **Cottonwood Spillgate –** Cottonwood spillgate is a flow control facility constructed on the Aqueduct and is used to occasionally release flows from the Aqueduct toward the Owens Lake bed when the Aqueduct is near or at capacity, undergoing normal maintenance, or for emergency Aqueduct releases. Annual discharges from the Cottonwood spillgate to the Owens Lake bed from the 1990/1991 to 2003/2004 water years ranged from 0 to 919 acre-feet, with average and median values of 196 and 59 acre-feet, respectively (LADWP, 2005b). Portions of the flow released from the Cottonwood spillgate typically reach the brine pool.
- **Inyo and Coso mountain streams –** There are no perennial streams from the Inyo and Coso mountains that reach the Owens Lake bed (GBUAPCD, 1997). Runoff from these mountains occurs only periodically when ephemeral stream channels contain flow in response to major precipitation events (GBUAPCD, 1997). Long-term monitoring of these ephemeral stream channels is not conducted. During stream flow monitoring conducted in 1994 and 1995 for the SIP EIR, a peak flow exceeding 918 cfs was observed during a large precipitation event at one of the Coso Mountain stream channels; no runoff was observed in the two Inyo Mountain stream channels during the monitoring period (GBUAPCD, 1997).

Seeps and Springs

Seeps and springs occur along the perimeter of the Owens Lake bed between the 3,560-foot and 3,600-foot elevation contours (GBUAPCD, 1997). The seeps and springs range from approximately 15 to 770 acres in size (GBUAPCD, 1997). They are located where the alluvial fans (consisting of coarser and more permeable sediments) intersect the surface of the playa (composed of less permeable lacustrine sediments of clay and silt) (GBUAPCD, 1997). Several abandoned artesian wells are located within or adjacent to many of the seeps and springs; these wells flow freely and contribute to discharges from the spring and seeps (GBUAPCD, 1997). Major seeps and springs located on and around the lake bed are labeled on **Figure 3-1**.

Discharge at seeps and springs has been estimated to be 4,800 acre-feet per year (GBUAPCD, 1997). Cottonwood Springs is one of the largest springs located on the west side of the lake bed. Most of the discharge from Cottonwood Springs flows through a downstream flume used by LADWP for measuring spring flow; annual discharges from Cottonwood Springs to the Owens Lake bed from the 1990/1991 to 2003/2004 water years ranged from 1,142 to 1,560 acre-feet, with average and median values of 1,328 and 1,293 acre-feet, respectively (LADWP, 2005b). Flows typically range from 1 to 3 cfs, and are fairly consistent throughout the year (LADWP, 2005b).

Dust Mitigation Program Areas

As described in **Section 3.2.1**, an extensive program to reduce dust emissions from the Owens Lake bed has been conducted since January 2002, which has substantially changed the environmental conditions of large portions of the Owens Lake playa. Dust control measures include the use of shallow flooding (applying water to the lake bed until it is either inundated with a few inches of water or the soil becomes saturated to the surface), managed vegetation (irrigated playa with saltgrass), and gravel layers (see **Figure 3-5**). Completed and planned dust control areas are presented in **Table 3-3** and **Figure 3-1**. As of November 2005, completed dust control areas consist of approximately 12,200 acres of shallow flooding and 2,400 acres of managed vegetation. (Managed vegetation areas are watered between mid-March and early November using drip irrigation, and therefore do not result in substantial ponding of water.)

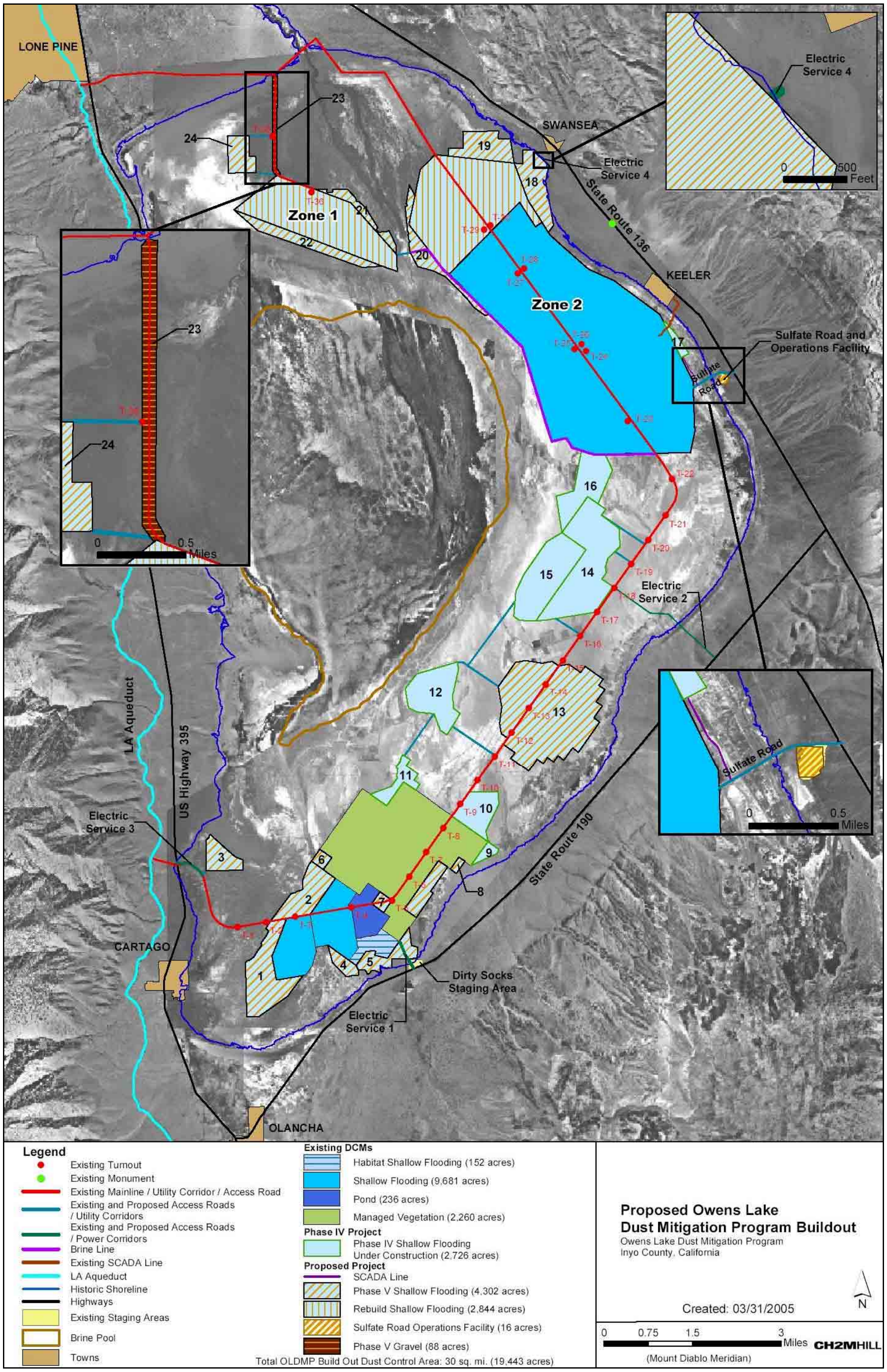
Shallow flooding areas are operated for 9 months between October 1 and June 30 each year (“dust season”). Water used for shallow flooding is diverted from the Aqueduct at Lubken and Cartago spillgates and conveyed to the lake bed via a system of pipelines and irrigation risers. Shallow flooding areas are separated into irrigation blocks (typically 500 to 1,000 acres per block) by berms (approximately 3 to 5 feet in height). Water applied to shallow flooding areas is recirculated, with freshwater added to compensate for evaporation and infiltration losses. Due to local topographic relief within the irrigation blocks, the shallow flooding operation results in a mosaic of shallow ponds (1 to 6 inches deep), saturated soil surfaces, unsaturated areas (such as mounds) and deep ponds (1 to 2 feet deep) (LADWP, 2004b).

Since November 2001, over 24,000 acre-feet per year of Aqueduct water has been applied to the dust control areas on the lake bed (annual average of approximately 26,700 acre-feet from 2001/2002 through 2004/2005 water years). Once all planned areas are completed, dust control activities are expected to require approximately 54,000 acre-feet per year. **Figure 3-6** presents the amount of water applied onto the lake bed for dust control purposes on a monthly basis since November 2001.

As part of current permit conditions for the Lakebed Alteration Agreement with the California Department of Fish and Game (CDFG) and the SLC lease agreement for dust control activities in the southern portion of the lake bed, LADWP is maintaining 1,000 acres of shorebird habitat within the Zone 2 shallow flood area in accordance with a habitat management plan (LADWP, 2004b). Habitat management includes additional shallow flooding between July 1 and July 20 and monitoring for shorebird populations, predators of shorebirds, water quality and vegetation (LADWP, 2004b).

In addition, approximately 152 acres of the shallow flooding areas within the southeastern portion of the lake bed are designated as a Habitat Shallow Flood area, which are managed according to specific criteria to provide suitable foraging habitat for shorebirds. Management of the Habitat Shallow Flood areas includes maintenance of TDS concentrations to below 120,000 mg/L to support development of invertebrate forage species (alkali flies) (Regional Board Order no. R6V-2002-001, adopted February 2002).

Figure 3-5
Existing and Future Dust Control Areas



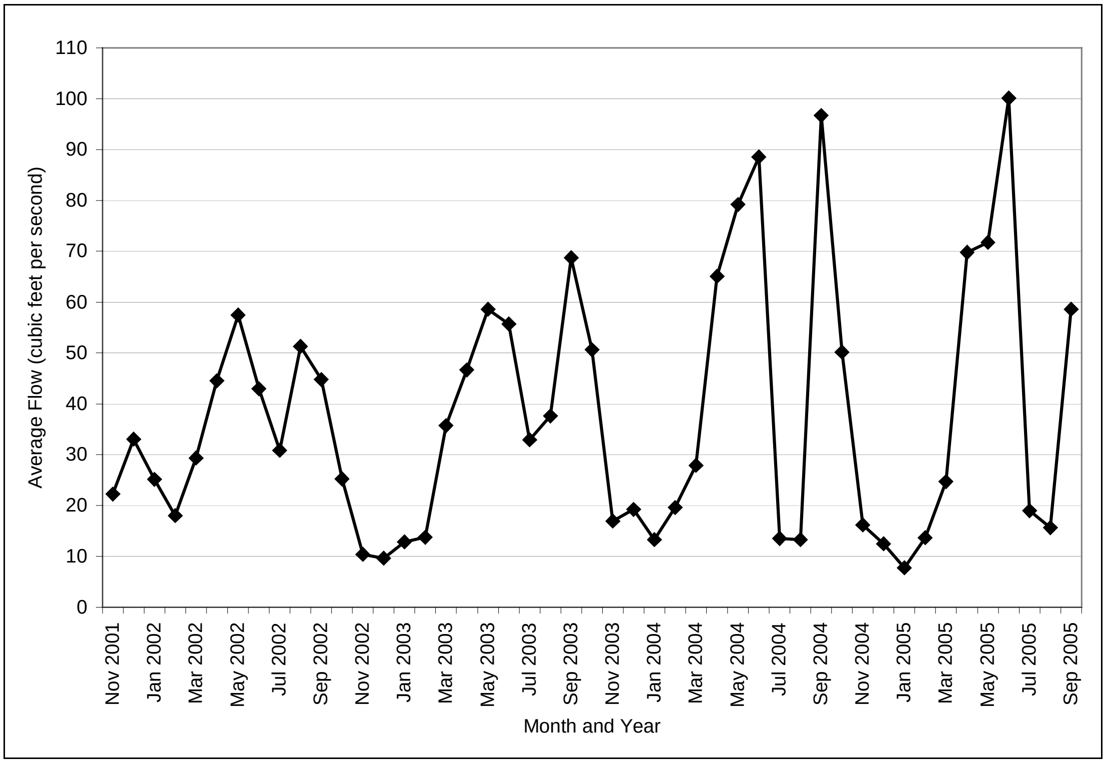
Source: LADWP, 2005c. OLDMP = Owens Lake Dust Mitigation Program

Table 3-3
Owens Lake Dust Mitigation Program Areas

Dust Control Area (see **Figure 3-1**)	Start of Operation	Approximate Surface Area (acres)				
		Shallow Flooding	**Operation Pond**	**Managed Vegetation**	**Gravel**	**Total**
Completed Areas						
North Sand Sheet Zone 2	January 2002	7,639	0	0	0	7,639
North Sand Sheet Zone 1	September 2002	1,179	0	0	0	1,179
Southern Zones	July 2002	0	211	2,401	0	2,612
Southern Zones	March 2003	1,004(1)	0	0	0	1,004
Phase IV	October 2005	2,387	0	0	0	2,387
Subtotal Completed Areas		*12,209*	*211*	*2,401*	*0*	*14,821*
Planned						
Phase V	November 2006(2)	4,435 (3)	0	-141(3)	88	4,382
Total		**16,644**	**211**	**2,260**	**88**	**19,203**

(1) Acreage includes 152 acres of Habitat Shallow Flood.
(2) Estimated schedule.
(3) Acreages include conversion of a portion of the existing managed vegetation area in the Southern Zones to shallow flooding. Shallow flooding acreage does not include the existing shallow flooding areas to be rebuilt (Zone 1 and the northern portion of Zone 2, a total of 2,844 acres) as part of Phase V (placing riprap on berms and modification to the pump system).

Figure 3-6
Aqueduct Water Delivered to the Owens Lake Dust Mitigation Program (November 2001 – September 2005, in cubic feet per second)



Brine Pool

The brine pool is defined as the portion of the Owens Lake bed below elevation 3,553.5 feet msl, (which is designated as the ordinary high water mark by the U.S. Army Corps of Engineers) (GBUAPCD, 1997). The brine pool has a surface area of approximately 20,000 acres, and its capacity has been estimated to be around 20,000 to 40,000 acre-feet (LADWP, 1947; GBUAPCD 2001 as cited in Jackson, 2001). The brine pool is a broadly concave and unvegetated area consisting of evaporative salt deposits and lake bed sediments. The brine pool substrate is saturated or covered with concentrated brine, and the brine level fluctuates from just below the surface to several inches above the surface, due to changes in evaporation and runoff conditions (GBUAPCD, 1997). The extent of surface water in the brine pool varies substantially on a seasonal basis and from year to year with the changes in the quantity of hydrologic inputs. The large fluctuation is also attributable to the fact that a small change in volume can result in substantial effects on the surface area because the brine pool is very shallow. Water in the brine pool can be red in color due to the presence of salt-tolerant bacteria.

Lake level records between 1938 and 1987 show that the extent of surface water within the brine pool was at least 20,000 acres in 31 out of 39 years and dropped below 5,000 acres in 26 out of those years (MHA 1995 as cited in Inyo County, 2004a). The range of surface water areas within the brine pool in more recent years is described below based on a review of Landsat images (satellite imagery, 15-meter or 30-meter resolution) that cover the entire lake bed and were taken in 2002 (two dates), 2004 (19 dates) and 2005 (eight dates) for the Owens Lake Dust Mitigation Program (see **Table 3-4**). The areal extent of surface water within the brine pool was delineated from these images by "heads-up" digitizing (the process of tracing outlines from a raster image on-screen).

As shown in **Table 3-4**, the acreage of surface water in the brine pool in 2002, 2004 and 2005 as delineated from the Landsat images ranged from less than 50 acres (less than 1 percent of the brine pool area) to approximately 20,000 acres (almost 100 percent of the brine pool area). Substantial seasonal and year-to-year fluctuations are evident. The general trend appears to be that the extent of surface water in the brine pool is minimal from approximately July through September, increases through fall and winter, and peaks around March before beginning to diminish. As shown in **Figure 3-7** through **Figure 3-10**, number and location of inundated areas can also vary.

Figure 3-7 (image dated September 17, 2004) represents the typical condition from approximately July through September, when surface water is present only in a small area along the west flank of the brine pool, which is topographically the lowest portion of the lake bed. Surface water in this area is likely maintained by the relatively consistent flow from the nearby Cottonwood Springs.

Figure 3-8 (image dated February 6, 2004) represents a condition in the winter where several bodies of water are present within the brine pool. The two main areas with surface water are the western margin (assumed to be supplied primarily by flows from Cottonwood Springs) and the northeastern portion directly south of the Delta. In addition, two smaller surface water areas are present in the far east portion (assumed to be supplied primarily by flows from Sulfate Well) and in the northwest portion (assumed to be supplied primarily by flows from Carroll Creek Springs).

As shown in **Figure 3-9** (image dated November 15, 2002) and **Figure 3-10** (image dated March 12, 2005), these separate inundated areas can become connected as the water level rises in the brine pool. **Figure 3-10** represents the condition when the brine pool is almost entirely inundated.

Table 3-4
Areal Extent of Surface Water in the Brine Pool Delineated from Satellite Imagery (2002, 2004, and 2005)

Month	2002		2004		2005	
	Date of Imagery	Estimated Acreage*	Date of Imagery	Estimated Acreage*	Date of Imagery	Estimated Acreage*
January	---		1/21	3,420	1/23	18,890
February	---		2/6	3,480	---	
March	---		3/9	6,440	3/12	20,330
			3/25	4,090		
April	---		4/10	1,130	4/13	18,750
			4/26	390	4/29	6,730
May	---		5/12	210	5/31	3,880
June	6/24	140	6/13	200	---	
			6/29	160		
July	---		7/23	130	7/2	40
					7/18	70
			7/31	110	7/26	50
August	---		---		---	
September	---		9/1	100	---	
			9/17	130	---	
October	---		10/3	190	---	
November	11/15	9,880	11/4	650	---	
			11/20	2,660		
			11/28	3,950		
December	---		12/14	1,660	---	
			12/22	3,630		

--- = No data

* Estimated acreage of surface water is based on delineation from Landsat images conducted by White Horse Associates.

Note: Precipitation in the Owens Valley was below average during the winter of 2003/2004, but was above average during the winter of 2004/2005.

Figure 3-7
Landsat Image of the Owens Lake Bed – September 17, 2004

Note: The Landsat images are color-infrared photographs, which are recorded on films that are more sensitive to the near-infrared portion of the spectrum. Infrared energy reflected by active vegetation is represented by tones of red, and water is represented by black.

Figure 3-8
Landsat Image of the Owens Lake Bed – February 6, 2004

Note: The Landsat images are color-infrared photographs, which are recorded on films that are more sensitive to the near-infrared portion of the spectrum. Infrared energy reflected by active vegetation is represented by tones of red, and water is represented by black.

Figure 3-9
Landsat Image of the Owens Lake Bed – November 15, 2002

Note: The Landsat images are color-infrared photographs, which are recorded on films that are more sensitive to the near-infrared portion of the spectrum. Infrared energy reflected by active vegetation is represented by tones of red, and water is represented by black.

Figure 3-10
Landsat Image of the Owens Lake Bed – March 12, 2005

Note: The Landsat images are color-infrared photographs, which are recorded on films that are more sensitive to the near-infrared portion of the spectrum. Infrared energy reflected by active vegetation is represented by tones of red, and water is represented by black.

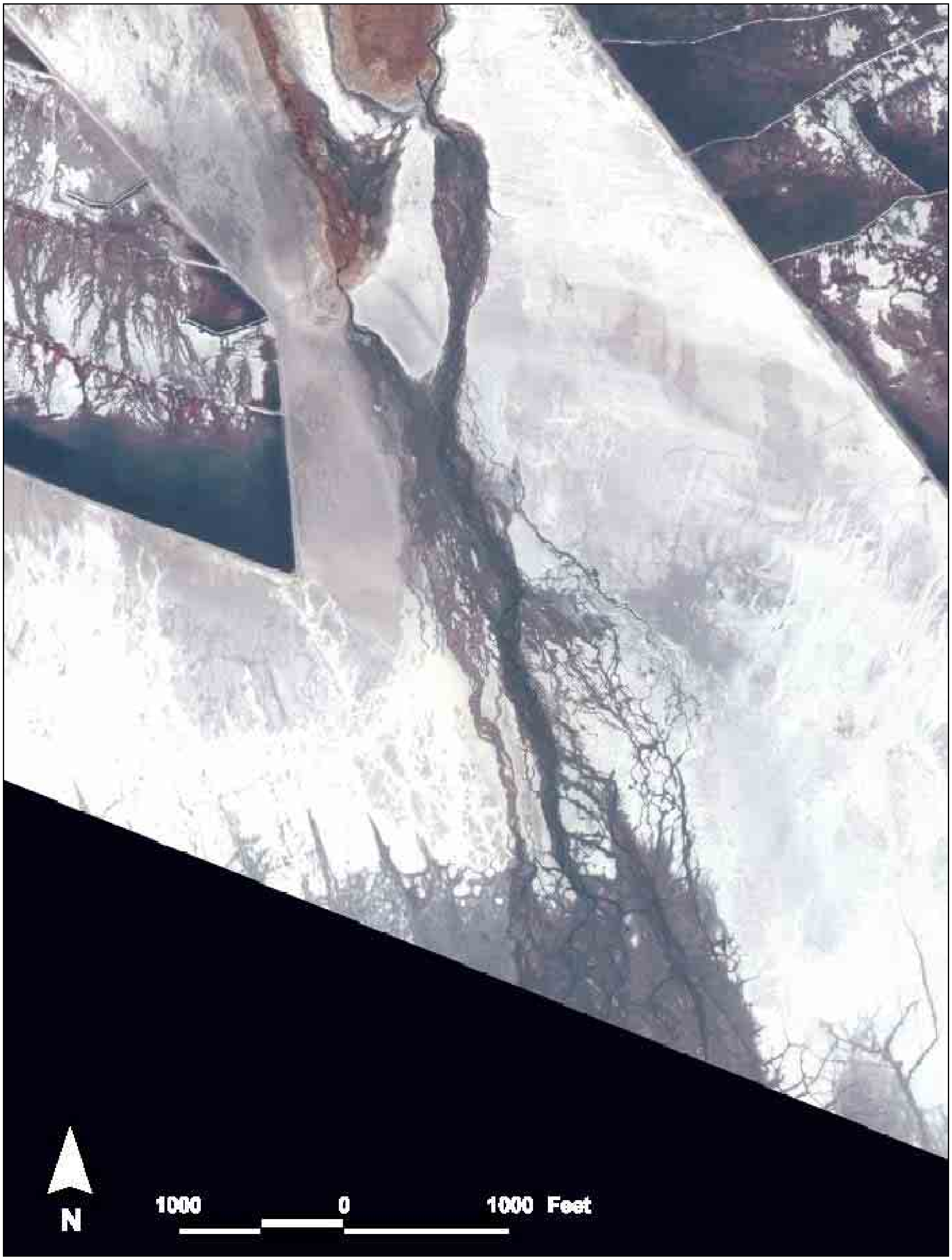
Brine Pool Transition Area

The focus of the analysis for this SEIR is the potential impacts on the lake bed that would result from operation of the proposed pump station, which would change the quantity and timing of Lower Owens River flows that reach the brine pool via the Delta. The specific area of interest is the brine pool transition area, which is a portion of the lake bed influenced by outflows from the Delta. This area is generally located in the northeastern portion of the brine pool and immediately south (downstream) of the end of the vegetated portions of the Delta (see **Figure 3-1**). The Zone 2 shallow flood area is located immediately to the northwest, Zone 1 shallow flood area is immediately to the northeast, and the Delta vegetation area is to the north. Vegetation is absent in the brine pool transition area. As described in further detail below, the hydrologic conditions in the brine pool transition area can vary seasonally and from year-to-year from completely dry, partially covered with meandering rivulets formed by outflows from the Delta, to partially or nearly completely inundated with standing water (see **Figure 3-11**, **Figure 3-12**, **Figure 3-13**, and **Figure 3-14**).

There are no gages that measure outflows from the Delta. Measurements at Keeler gage can be used to estimate inflows to the Delta but since specific channel loss rates (percolation, evaporation and evapotranspiration) are not known, the following sources of information (in addition to the Landsat images described above) were reviewed to qualitatively describe the hydrologic conditions in the brine pool transition area (the images and photographs that were reviewed are listed in **Table 3-5)**:

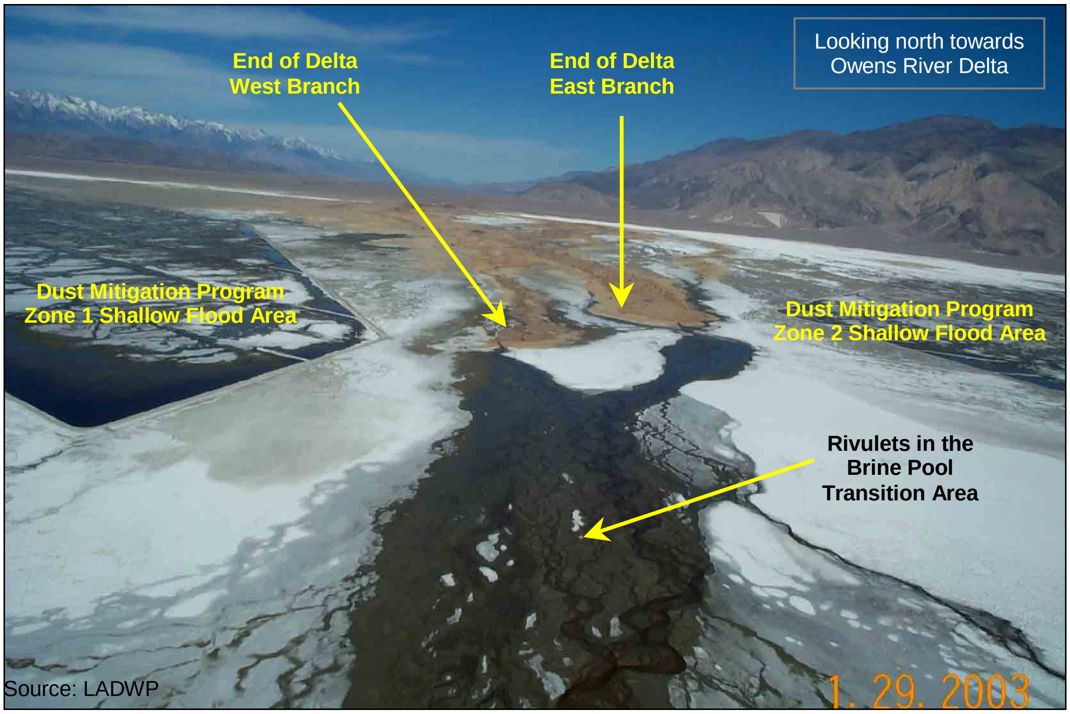
- Aerial photographs (1:12,000 scale, color images) covering the entire Delta and northeastern margin of the brine pool and taken in July 1993, August 1996 and April 1999
- Aerial photographs (2-foot resolution) taken in September 2000 and covering the entire lake bed
- Twenty-nine Landsat (satellite) 15-meter resolution images covering the entire lake bed and taken between June 2002 and July 2005
- Six QuickBird (satellite) 2-foot resolution images that cover the Delta, adjacent dust control areas (North Sand Sheet Zones 1 and 2), and northeastern portion of the brine pool, taken between January 2004 and February 2005
- One set of IKONOS (satellite) 1-meter resolution images covering most of the lake bed and taken in August 2005
- Photographs taken from a helicopter between January 2001 and March 2005
- Ground photographs and/or field observations between May 2001 and November 2005

Figure 3-11
Rivulets Formed by Outflows from the Owens River Delta
(QuickBird Satellite Imagery dated January 4, 2004)

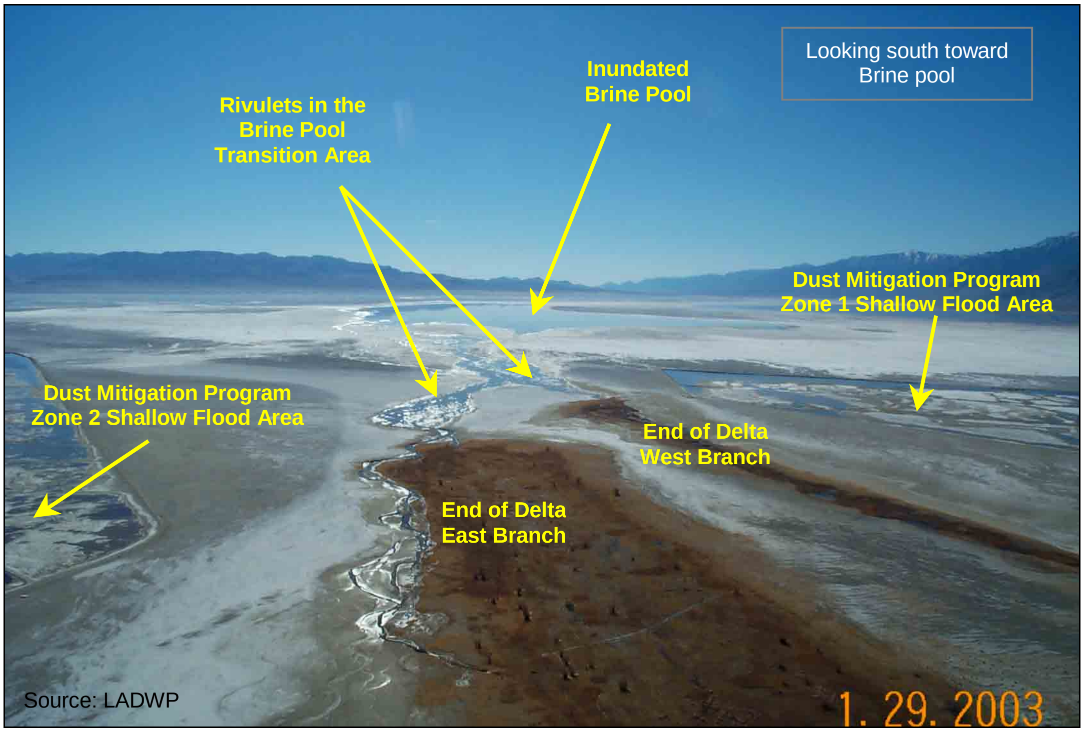


Note: The QuickBird images are color-infrared photographs, which are recorded on films that are more sensitive to the near-infrared portion of the spectrum. Infrared energy reflected by active vegetation is represented by tones of red, and water is represented by black.

Figure 3-12
Helicopter Photographs of the Brine Pool Transition Area (January 29, 2003)

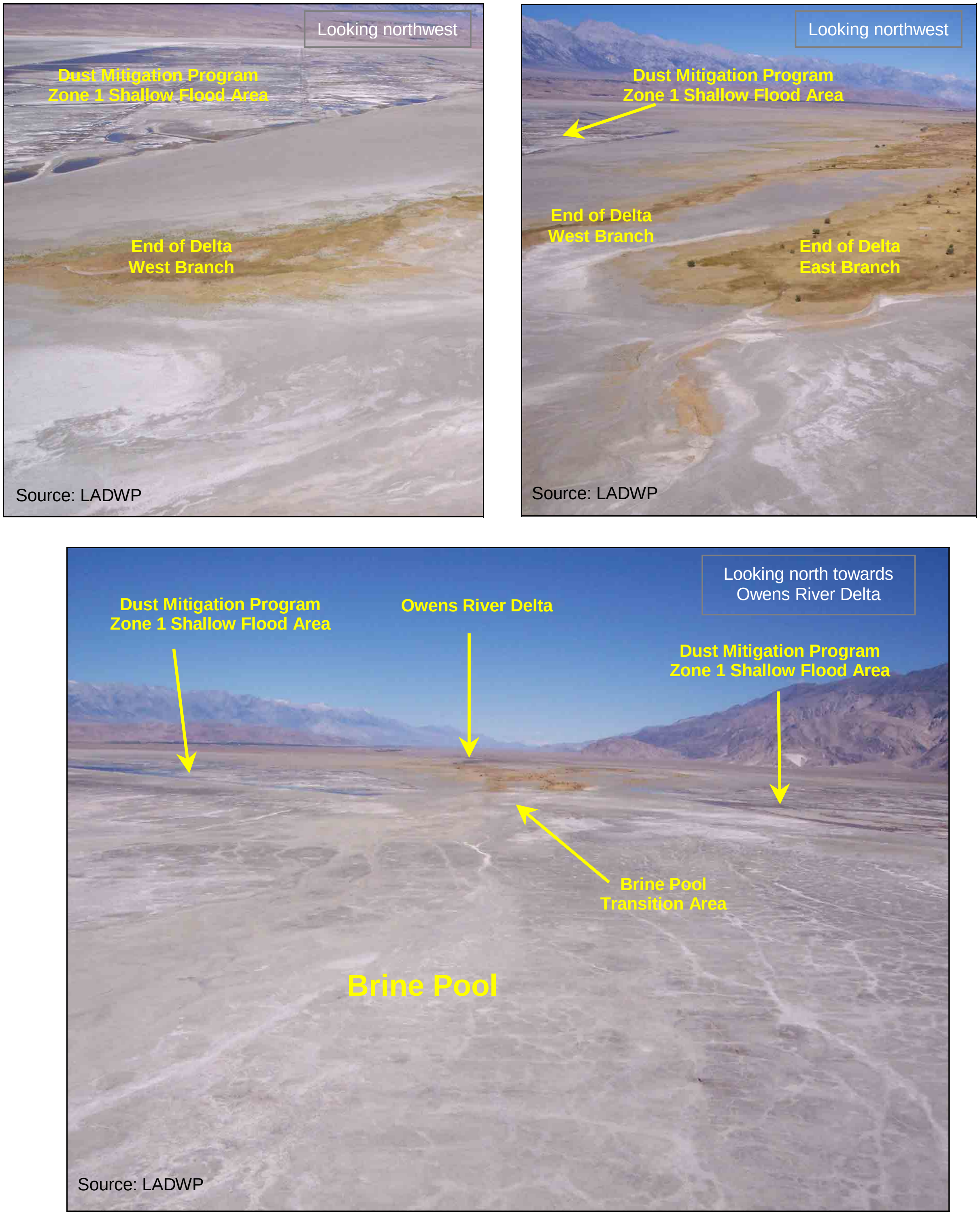


Source: LADWP



Source: LADWP

Figure 3-13
Helicopter Photographs of the Brine Pool Transition Area
(September 20, 2004)



Source: LADWP

Source: LADWP

Source: LADWP

Figure 3-14
Ground Photographs of the Brine Pool Transition Area
(November 15, 2004)

Approx. 1,800 feet south of Delta West Branch, Looking east

Source: White Horse Associates

Approx. 3,000 feet south of Delta West Branch, Looking east

Source: White Horse Associates

Approx. 4,200 feet south of Delta West Branch, Looking east

Source: White Horse Associates

Approx. 3,600 feet south of Delta West Branch, Looking north

Source: White Horse Associates

Approx. 6,000 feet south of Delta West Branch, Looking north

Source: White Horse Associates

Based on review of the above, the presence and absence of outflow from the Delta is noted in **Table 3-5** for each date of observation (remote imagery, helicopter/ground photographs, or field observations). The average daily flow measured at Keeler gage on the date of observation is also noted so that the presence/absence of outflow can be correlated to the discharge at Keeler gage; in addition, the minimum and maximum average daily flows for the 5-day period preceding and including the date of observation are noted.

The years covered by these data (1993, 1996, and 1999 through 2005) represent a range of precipitation/runoff conditions for the Owens Valley, from dry (2002), dry to average (1999, 2000, 2001, 2003 and 2004), and average to wet (2005).

The following observations are based on review of these data:

- Outflows from the Delta toward the brine pool generally occur from October/November through March/April.
- From April/May through September/October after 2000, there are typically no outflows from the Delta into the brine pool.
- In the summers after 2000, even relatively high River flows (greater than 9 cfs) measured at Keeler gage do not result in outflow from the Delta (see, for example, data for August 2002 and September 2004).
- In the winter when there are lower evapotranspiration rates, even lower River flows (as low as 5 cfs) measured at Keeler gage result in outflow from the Delta (see, for example, data for November 2004). However, the absolute minimum flow at Keeler gage which would result in outflow to the brine pool transition area cannot be determined from review of these data due to the high variability of seasonal and annual temperatures and hydrologic conditions.
- The rivulets of flowing water in the brine pool transition area can be observed within an area up to approximately 0.5-mile wide and extending up to approximately 2.5 miles into the brine pool from the southern end of the vegetated portions of the Delta. The rivulets drain into the northeastern portion of the brine pool (see **Table 3-4**). When the water level in the brine pool increases (i.e., boundary of the inundated portion moves north), the linear extent of the rivulets decreases to less than 1 mile.
- Based on field observations on November 15, 2004 by S. Jensen, White Horse Associates, outflows to the brine pool transition area were visually estimated to be less than 3 cfs, and the depth of water in the rivulets was estimated to range up to 2 to 3 inches. Flow at the Keeler gage was measured at 7.9 cfs on this date.
- Since the width of an individual rivulet is often less than 15 meters, the resolution of the Landsat images (15-meter or 30-meter) described above is not high enough to allow delineation of the wetted rivulets within the brine pool transition area. The QuickBird images have a higher resolution than the Landsat images, but they only cover approximately the northern one-third of the brine pool transition area, and are only available for a limited number of days. Therefore, the acreage of rivulets with flowing water within the brine pool transition area was approximated by using the following approach. First, the high-resolution (2-foot pixels) aerial photograph of the brine pool

transition area dated September 2000 was used to delineate the portion of the brine pool transition area with topography suitable for flooding by outflows from the Delta (a total of approximately 220 acres). Second, based on the delineation of the inundated portions of the brine pool from the Landsat images (see description above and **Table 3-4**), the acreage of the inundated portion of the brine pool transition area was subtracted from the 220 acres; the remaining acreage represents the approximate extent of the rivulets containing flowing water. This approach is based on the assumption that the locations of the rivulets (i.e., areas with topography suitable for flooding by outflows from the Delta) do not change substantially from year to year, and provides an order of magnitude estimate.

Based on this approach, the extent of the rivulets with flowing water was approximated to range from around 10 to 30 acres (e.g., November, February and March of 2004 and January, March and Aril of 2005), 50 to 90 acres (January 2004, November 28, 2004, and December 2004), to 140 to 170 acres (November 4 and 20, 2004).

- Portions of the brine pool transition area that are outside of the rivulets (i.e., areas typically not subject to seasonal flooding by outflows from the Delta) consist of substrate that is saturated with hyper-saline water at or near the surface and are not distinguishable from the rest of the brine pool.

Table 3-5
Presence / Absence of Outflow from Owens River Delta

Data Source*	**Data Type / Method of Observation**	**Date of Observation**			**Keeler Gage Flow (cfs)**		**Outflow from Delta?**	**Bird Use***** (See **Section 3.2.3.1** and **Appendix B**)
		Year	**Month**	**Day**	**Avg. Daily Flow on Date of Observation**	**Min-Max Avg. Daily Flows Previous 5-day Period****		
1993								
[1]	Aerial	1993	July	16	0.0	0.0-0.1	No	---
1996								
[2]	On Foot	1996	March	23	18.0	18.0	Yes	Yes
[2]	On Foot	1996	May	6	14.0	14.0-20.0	Yes	Yes
[1]	Aerial	1996	August	7	8.8	8.8-11.8	Yes	---
1999								
[1]	Aerial	1999	April	13	11.0	10.0-11.0	Yes	---
[2]	On Foot	1999	August	17	9.8	9.8-11.3	Yes	Yes
[2]	On Foot	1999	August	24	10.6	9.3-10.6	Yes	Yes
[2]	On Foot	1999	August	29	14.9	11.3-15.4	Yes	Yes
[2]	On Foot	1999	September	12	13.6	13.4-16.6	Yes	Yes
[2]	On Foot	1999	September	26	15.5	14.2-15.5	Yes	Yes
[2]	On Foot	1999	October	17	15.7	15.6-16.2	Yes	Yes
[2]	On Foot	1999	October	23	16.0	15.4-16.0	Yes	Yes

Table 3-5 (Continued)
Presence / Absence of Outflow from Owens River Delta

Data Source*	Data Type / Method of Observation	Date of Observation			Keeler Gage Flow (cfs)		Outflow from Delta?	Bird Use*** (See **Section 3.2.3.1** and **Appendix B**)
		Year	Month	Day	Avg. Daily Flow on Date of Observation	Min-Max Avg. Daily Flows Previous 5-day Period**		
2000								
[2]	On Foot	2000	January	3	16.0	16.0-16.3	Yes	Yes
[2]	On Foot	2000	March	25	16.2	16.2-19.2	Yes	Yes
[2]	On Foot	2000	April	2	20.4	17.1-20.4	Yes	Yes
[2]	On Foot	2000	April	9	15.1	15.1-16.7	Yes	Yes
[2]	On Foot	2000	April	12	15.1	15.1-15.5	Yes	Yes
[2]	On Foot	2000	April	21	15.5	15.3-15.5	Yes	Yes
[2]	On Foot	2000	May	20	6.3	6.1-7.6	****	Yes
[2]	On Foot	2000	June	3	5.3	3.6-5.3	No	Yes
[2]	On Foot	2000	July	24	9.1	7.3-9.1	Yes	No
[2]	On Foot	2000	August	1	12.0	10.0-12.0	Yes	Yes
[2]	On Foot	2000	August	14	9.2	9.2-11.8	Yes	Yes
[2]	On Foot	2000	August	22	11.6	9.6-11.9	Yes	Yes
[1]	Aerial	2000	September	(Date unknown)	12.3 (average for September)	3.4-31.3 (min-max for September)	No	---
[3]	ATVs	2000	December	21	14.5	14.5-30.0	Yes	Yes
2001								
[3]	Helicopter	2001	January	3	13.8	13.1-13.8	Yes	No
[2]	On Foot	2001	April	1	11.0	11.0-16.4	Yes	Yes
[2]	On Foot	2001	April	15	9.2	8.1-9.2	Yes	Yes
[2]	On Foot	2001	April	22	6.9	6.9-9.3	Yes	Yes
[3]	On Foot	2001	May	15	3.6	3.3-4.1	No	No
[3]	Helicopter	2001	May	16	3.3	3.3-4.1	No	No
[2]	On Foot	2001	May	20	2.3	2.3-3.3	No	No
[3]	On Foot	2001	May	31	0.9	0.9-1.2	No	No
[2]	On Foot	2001	June	2	0.9	0.9-1.2	No	No
[2]	On Foot	2001	June	14	0.2	0.2-0.5	No	No
[2]	On Foot	2001	June	22	0.3	0.0-0.3	No	No
[2]	On Foot	2001	August	20	3.0	2.4-3.0	No	No
[2]	On Foot	2001	September	1	4.5	4.5-23.3	No	No
[2]	On Foot	2001	September	15	10.8	10.3-11.4	No	Yes
[2]	On Foot	2001	October	26	16.3	14.5-16.3	Yes	No

Table 3-5 (Continued)
Presence / Absence of Outflow from Owens River Delta

Data Source*	Data Type / Method of Observation	Date of Observation			Keeler Gage Flow (cfs)		Outflow from Delta?	Bird Use*** (See **Section 3.2.3.1** and **Appendix B**)
		Year	Month	Day	Avg. Daily Flow on Date of Observation	Min-Max Avg. Daily Flows Previous 5-day Period**		
2002								
[2]	On Foot	2002	January	13	13.1	13.0-13.4	Yes	Yes
[2]	On Foot	2002	February	2	12.3	12.2-12.4	Yes	Yes
[2]	On Foot	2002	March	11	13.1	12.2-13.3	Yes	Yes
[2]	On Foot	2002	April	25	10.1	10.1-11.0	Yes	Yes
[4]	On Foot	2002	April	26	10.8	10.1-11.0	Yes	Yes
[2]	On Foot	2002	May	3	8.9	8.9-10.9	Yes	Yes
[4]	On Foot	2002	May	24	4.6	3.7-5.3	Yes	Yes
[4]	On Foot	2002	June	20	3.2	3.2-3.7	No	Yes
[6]	Landsat	2002	June	24	2.5	2.5-3.2	No	---
[4]	On Foot	2002	August	16	9.0	7.7-9.0	No	Yes
[4]	On Foot	2002	October	11	7.8	7.1-7.8	No	Yes
[6]	Landsat	2002	November	15	13.2	13.2-14.5	Yes	---
2003								
[3]	Helicopter	2003	January	29	11.6	11.2-11.6	Yes	---
[4]	On Foot	2003	January	30	11.4	11.2-11.6	Yes	Yes
[3]	Helicopter	2003	August	7	55.0*****	48.0-115.0	No	No
[2]	On Foot	2003	October	26	8.0	7.7-8.0	Yes	No
2004								
[7]	QuickBird	2004	January	4	9.6	9.5-9.8	Yes	---
[8]	Helicopter	2004	January	12	9.8	9.5-9.8	Yes	---
[6]	Landsat	2004	January	21	10.3	10.3-10.7	Yes	---
[7]	QuickBird	2004	February	4	10.8	10.3-10.9	Yes	---
[6]	Landsat	2004	February	6	10.5	10.3-10.9	Yes	---
[6]	Landsat	2004	March	9	11.7	11.7-12.3	Yes	---
[6]	Landsat	2004	March	25	9.2	9.2-9.7	Yes	---
[7]	QuickBird	2004	April	6	7.8	7.6-9.5	Yes	---
[6]	Landsat	2004	April	10	7.5	7.5-7.8	No	---
[6]	Landsat	2004	April	26	6.0	5.8-6.4	No	---
[7]	QuickBird	2004	May	4	5.0	5.0-5.6	No	---
[6]	Landsat	2004	May	12	3.4	3.4-4.8	No	---
[7]	QuickBird	2004	June	7	0.9	0.9-1.1	No	---
[6]	Landsat	2004	June	13	0.7	0.7-0.9	No	---
[6]	Landsat	2004	June	29	2.4	0.7-2.4	No	---
[6]	Landsat	2004	July	23	4.1	4.1-4.7	No	---
[6]	Landsat	2004	July	31	3.1	3.0-3.3	No	---

Table 3-5 (Continued)
Presence / Absence of Outflow from Owens River Delta

Data Source*	Data Type / Method of Observation	Date of Observation			Keeler Gage Flow (cfs)		Outflow from Delta?	Bird Use*** (See **Section 3.2.3.1** and **Appendix B**)
		Year	Month	Day	Avg. Daily Flow on Date of Observation	Min-Max Avg. Daily Flows Previous 5-day Period**		
[6]	Landsat	2004	September	1	27.6	8.2-27.6	No	---
[8]	On Foot	2004	September	3	14.2	14.2-27.6	No	---
[6]	Landsat	2004	September	17	4.8	4.7-5.0	No	---
[8]	Helicopter	2004	September	20	4.9	4.7-4.9	No	---
[6]	Landsat	2004	October	3	7.8	7.2-7.8	No	---
[6]	Landsat	2004	November	4	4.7	4.7-5.4	Yes	---
[9]	On Foot	2004	November	15	7.9	6.7-7.9	Yes	---
[6]	Landsat	2004	November	20	8.4	8.0-8.5	Yes	---
[6]	Landsat	2004	November	28	7.4	7.4-8.2	Yes	---
[6]	Landsat	2004	December	14	8.5	7.9-8.5	Yes	---
[6]	Landsat	2004	December	22	9.2	8.8-9.2	Yes	---
2005								
[6]	Landsat	2005	January	23	13.4	13.4-13.5	Yes	---
[7]	QuickBird	2005	February	24	14.8	13.4-16.6	Yes	---
[6]	Landsat	2005	March	12	11.2	11.2-11.9	Yes	---
[3]	Helicopter	2005	March	28	9.5	9.5-9.9	Yes	No
[5]	On Foot	2005	April	1	9.6	9.5-9.6	Yes	Yes
[10]	On Foot	2005	April	3	9.7	9.5-9.7	Yes	Yes
[10]	On Foot	2005	April	11	8.9	8.6-8.9	Yes	Yes
[6]	Landsat	2005	April	13	8.8	8.8-8.9	Yes	---
[5]	On Foot	2005	April	14	8.4	8.4-8.9	Yes	Yes
[6]	Landsat	2005	April	29	7.0	6.7-7.0	Yes	---
[5]	On Foot	2005	April	29	7.0	6.7-7.0	Yes	Yes
[10]	On Foot	2005	May	1	7.1	6.7-7.2	Yes	Yes
[10]	On Foot	2005	May	8	6.0	6.0-6.6	Yes	Yes
[5]	On Foot	2005	May	13	5.5	5.5-5.9	Yes	Yes
[6]	Landsat	2005	May	31	2.0	2.0-2.9	No	---
[5]	On Foot	2005	June	2	2.3	2.0-2.6	No	Yes
[5]	On Foot	2005	June	24	1.3	1.1-1.5	No	Yes
[6]	Landsat	2005	July	2	1.2	1.1-1.2	No	---
[6]	Landsat	2005	July	18	5.9	4.6-5.9	No	---
[6]	Landsat	2005	July	26	4.8	4.8-6.3	No	---

Table 3-5 (Continued)
Presence / Absence of Outflow from Owens River Delta

Data Source*	Data Type / Method of Observation	Date of Observation			Keeler Gage Flow (cfs)		Outflow from Delta?	Bird Use*** (See **Section 3.2.3.1** and **Appendix B**)
		Year	Month	Day	Avg. Daily Flow on Date of Observation	Min-Max Avg. Daily Flows Previous 5-day Period**		
[11]	IKONOS	2005	August	1	4.3	3.6-4.3	No	---
[5]	On Foot	2005	August	4	3.5	3.5-4.3	No	Yes
[12]	On Foot	2005	August	11	4.1	3.5-4.1	No	---
[5]	On Foot	2005	August	24	4.1	4.1-4.7	No	No
[5]	On Foot	2005	September	12	3.9	2.8-3.9	No	Yes
[5]	On Foot	2005	September	26	9.4	8.8-9.4	No	Yes
[5]	On Foot	2005	October	12	9.2	9.2-10.1	No	Yes
[5]	On Foot	2005	November	16	9.0	9.0-9.6	Yes	Yes

--- = Not noted.

* Data Sources:

[1] Aerial photographs analyzed by White Horse Associates (2004).

[2] Unpublished information submitted by M. Prather, Owens Valley Committee, to LADWP with a comment letter (dated September 20, 2005) on the NOP for this SEIR (see **Appendix A**). Based on personal communication (telephone) from M. Prather to A. Kawaguchi, MWH (November 1, 2005), water in the outflow area was assumed to be present for survey dates with no specific notation regarding presence or absence of flow.

[3] Unpublished information recorded during general habitat and condition surveys and compiled by D. House, LADWP Watershed Resources Specialist.

[4] Unpublished information collected by LADWP and Inyo County, and local volunteers for the Lower Owens River Project Baseline Bird Monitoring Survey and compiled by D. House, LADWP Watershed Resources Specialist.

[5] Unpublished information collected by LADWP for the Lower Owens River Project Baseline Bird Monitoring Survey and compiled by D. House, LADWP Watershed Resource Specialist

[6] Landsat satellite imagery obtained by LADWP for the Owens Lake Dust Mitigation Program.

[7] QuickBird satellite imagery obtained by LADWP for the Owens Lake Dust Mitigation Program.

[8] Photographs taken by LADWP staff from a helicopter.

[9] Photographs and field observations by S. Jensen, White Horse Associates, on November 15, 2004.

[10] Unpublished information (data recorded as part of the International Shorebird Survey) submitted by M. Prather, Owens Valley Committee (personal communication to W. Bamossy, LADWP, October 12, 2005)

[11] IKONOS satellite imagery obtained by LADWP for the Owens Lake Dust Mitigation Program.

[12] Photographs and field observations by S. Garber, MWH, on August 11, 2005.

** Range of values indicate the minimum and maximum average daily flows measured at Keeler gage during the 5-day period preceding and including the date of observation.

*** For each date of observation with "Yes" in this column, the number and species of birds observed on that date are presented in **Appendix B**. "No" indicates that there were no birds observed on that date. "---" indicates that there are no bird data available for that date.

**** Noted as central channel dry by source [2].

***** High flows at Keeler gage due to an emergency release from the Aqueduct to the River as a result of flash floods in the southern Owens Valley caused by thunderstorms. While not outflows from the Delta were noted on the date of observation, it is likely that outflows were present in the preceding days since substantial flooding of the northeastern portion of the brine pool is evident in the helicopter photographs.

3.2.2.3 Groundwater

The Owens Lake is underlain by the Owens Lake groundwater subbasin, which is the southern most part of the Owens Valley groundwater basin. The Owens Valley groundwater basin extends 120 miles north from Haiwee Reservoir (located south of Owens Lake) to the California-Nevada border in Mono County (Inyo County, 2004a), and is bounded by the Benton Range on the north, the Coso Range on the south, the Sierra Nevada on the west, and the White and Inyo Mountains on the east (CDWR, 2004). The general trend of groundwater flow is toward the center of the valley and to the south (GBUAPCD, 2003).

In the upper 1,000 feet below the Owens Lake bed, it is postulated that there are four aquifer bodies, consisting of a sequence of clay deposits (aquitards) interbedded with several sand/gravel deposits (aquifers) (GBUAPCD, 2003). An upward gradient of groundwater is present within the lake bed (GBUAPCD, 1997). Artesian conditions are common on the margins of the lake and the lake itself. Because of this upward vertical flow, the lower elevations of the lake bed are saturated, and groundwater is at or near the surface over a wide area of the lake bed. The playa areas of the lake bed are underlain by shallow groundwater, with depths to groundwater ranging between zero at seeps and springs, 2 to 4 feet in the Delta and 10 to 16 feet in the crusted clay areas in the southeastern portion of the lake bed (Inyo County, 2004a; Regional Board, 2005a). The general hydrologic gradient in the shallow groundwater is toward the brine pool (GBUAPCD, 2003). The gradients in the deeper aquifers are thought to be generally toward the southern portion of the lake (GBUAPCD, 2003).

Sources of groundwater inflows into the Owens Lake subbasin include (GBUAPCD, 1997):

- Subsurface flows from the northern portion of the Owens Valley basin (5,000 to 20,000 acre-feet per year) and Centennial Flat/other areas (1,500 to 3,400 acre-feet per year)
- Stream channel recharge in the surrounding mountains (5,550 to 9,800 acre-feet per year)
- Mountain block recharge (water entering the groundwater basin via cracks and crevices of the bedrock in the mountains; 4,000 to 10,000 acre-feet per year)
- Infiltration into the shallow groundwater system through the Delta [Note, infiltration was estimated by GBUAPCD to be 3,840 to 7,800 acre-feet per year based on long-term (since 1927) average flow data.]
- Recharge through the alluvial fan due to direct precipitation and infiltration (330 to 980 acre-feet per year)

Groundwater is naturally discharged from the underlying aquifers as spring flow or through evaporation of confined water leaking upward; the artesian flowing wells/springs in this area of the lake draw from these aquifers. Groundwater discharges from the Owens Lake due to evaporation from the playa and brine pool are estimated to average 20,190 and 17,600 acre-feet per year, respectively (GBUAPCD, 1997). Groundwater discharges from seeps and springs (evapotranspiration and outflow) are estimated to average 12,250 acre-feet per year (GBUAPCD, 1997).

In the valley, groundwater is pumped for domestic, grazing, and irrigation use, and for export to the City of Los Angeles via the Los Angeles Aqueduct. Groundwater pumping from the Owens Lake aquifers occurs to supply the potable water needs of nearby communities, as well as exportation for commercial uses (GBUAPCD, 2003). As reported by GBUAPCD (2003), the estimated average annual Owens Lake basin groundwater pumpage is approximately 5,173 acre-feet per year. A more recent analysis conducted for the Crystal Geyser Roxane Beverage Bottling Plant EIR estimated that the total groundwater use in the Owens Lake sub-basin is on the order of 1,170 acre feet per year (Inyo County, 2004b).

3.2.2.4 Water Quality

Basin Plan Objectives

The Owens Lake lies within the jurisdiction of the California Regional Water Quality Control Board, Lahontan Region (Regional Board). The Regional Board establishes water quality standards for the Lahontan Region in its Water Quality Control Plan, commonly known as the Basin Plan (Regional Board, 1994). The Basin Plan presents designated beneficial uses for surface and ground waters and numeric and narrative water quality objectives necessary to achieve the beneficial uses. In addition, the Basin Plan includes the Nondegradation Objective, which applies to all waters of the Lahontan Region. The Nondegradation Objective requires continued maintenance of existing high quality waters; whenever the existing quality of water is better that the quality of water established in this Basin Plan as objectives, such existing quality is to be maintained unless appropriate findings are made under the policy.

The Basin Plan does not contain numeric water quality objectives specific to Owens Lake. Of the Basin Plan water quality objectives that apply to all surface waters (including wetlands) within the Lahontan Region (Basin Plan Chapter 3, “Water Quality Objectives”), the following may be relevant to the proposed project.

Nondegradation of Aquatic Communities and Populations

- All wetlands shall be free from substances attributable to wastewater or other discharges that produce adverse physiological responses in humans, animals, or plants; or which lead to the presence of undesirable or nuisance aquatic life.
- All wetlands shall be free from activities that would substantially impair the biological community as it naturally occurs due to physical, chemical and hydrologic processes.

Temperature

- The natural receiving water temperature of all waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Board that such an alteration in temperature does not adversely affect the water for beneficial uses.
- For waters designated WARM, water temperature shall not be altered by more than five degrees Fahrenheit (5°F) above or below the natural temperature. For waters designated COLD, the temperature shall not be altered.

- Temperature objectives for COLD interstate waters and WARM interstate waters are as specified in the "Water Quality Control Plan for Control of Temperature in The Coastal and Interstate Waters and Enclosed Bays and Estuaries of California" including any revisions.

Basin Plan Chapter 4 ("Implementation") describes the actions (to be implemented by Regional Board, other state agencies, or others) necessary to achieve the water quality objectives. Chapter 4.9 ("Resources Management and Restoration") describes the water quality protection policies, resource management and restoration activities, their related water quality problems and control actions. The Regional Board identified the following subsections of Chapter 4.9 as potentially relevant to the proposed project (Regional Board comment letter on the NOP for this SEIR, see **Appendix A**): Water Quality/Quantity Issues, Wetlands Protection and Management, Floodplain and Riparian Area Protection, Sensitive Species and Biological Communities, and Watershed Restoration. The operation of the proposed LORP pump station would not conflict with the policies described in these subsections, and would not hinder implementation of the control actions and recommended future actions described in these subsections.

Designated beneficial uses for surface and ground waters of the Owens Lake area are shown in **Table 3-6**.

Table 3-6
Beneficial Uses for Surface and Ground Waters of the Owens Lake Area

Beneficial Use	**Surface Water**				**Ground-water**
	Owens Lake (Intermittent Lake)	**Owens Lake Wetlands (Wetlands)**	**Minor Surface Waters of the Lower Owens Hydrologic Area**	**Minor Wetlands of the Lower Owens Hydrologic Area**	**Owens Valley Basin**
Municipal and Domestic Supply (MUN) – Community, military, or individual water supply systems including, but not limited to, drinking water supply	X*	X*	X	X	X
Agricultural Supply (AGR) – Farming, horticulture, or ranching, including, but not limited to, irrigation, stock watering, and support of vegetation for range grazing		X	X	X	X
Industrial Service Supply (IND) – Industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, geothermal energy production, hydraulic conveyance, gravel washing, fire protection, and oil well repressurization			X		X
Groundwater Recharge (GWR) – Natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers		X	X	X	
Freshwater Replenishment (FRSH) – Natural or artificial maintenance of surface water quantity or quality (e.g., salinity).				X	X
Water Contact Recreation (REC-1) – Recreational activities involving body contact with water where ingestion of water is reasonably possible	X	X	X	X	
Non-contact Water Recreation (REC-2) – Recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water is reasonably possible	X	X	X	X	
Commercial and Sportfishing (COMM) – Commercial or recreational collection of fish or other organisms including, but not limited to, uses involving organisms intended for human consumption.	X		X	X	
Warm Freshwater Habitat (WARM) – Warm water ecosystems including, but not limited to, preservation and enhancement of aquatic habitats, vegetation, fish, and wildlife, including invertebrates	X	X	X	X	
Cold Freshwater Habitat (COLD) – Cold water ecosystems including, but not limited to, preservation and enhancement of aquatic habitats, vegetation, fish, and wildlife, including invertebrates	X	X	X	X	
Inland Saline Water Habitat (SAL) – Inland saline water ecosystems including, but not limited to, preservation and enhancement of aquatic saline habitats, vegetation, fish, and wildlife, including invertebrates	X				

Table 3-6 (Continued)
Beneficial Uses for Surface and Ground Waters of the Owens Lake Area

Beneficial Use	Surface Water				Groundwater
	Owens Lake (Intermittent Lake)	Owens Lake Wetlands (Wetlands)	Minor Surface Waters of the Lower Owens Hydrologic Area	Minor Wetlands of the Lower Owens Hydrologic Area	Owens Valley Basin
Wildlife Habitat (WILD) – Wildlife habitats including, but not limited to, the preservation and enhancement of vegetation and prey species used by wildlife, such as waterfowl	X	X	X	X	X
Rare, Threatened, or Endangered Species (RARE) – Habitat necessary for the survival and successful maintenance of plant or animal species established under state and/or federal law as rare, threatened or endangered.			X		
Spawning, Reproduction, and Development (SPWN) – High quality aquatic habitat necessary for reproduction and early development of fish and wildlife.			X		
Water Quality Enhancement (WQE) – Beneficial uses of waters that support natural enhancement or improvement of water quality in or downstream of a water body including, but not limited to, erosion control, filtration and purification of naturally occurring water pollutants, streambank stabilization, maintenance of channel integrity, and siltation control		X		X	
Flood Peak Attenuation/Flood Water Storage (FLD) – Riparian wetlands in flood plain areas and other wetlands that receive natural surface drainage and buffer its passage to receiving waters.		X		X	

Source: Regional Board, 1994.

* In April 2005, the Regional Board proposed to remove the MUN designation from surface waters of Owens Lake (Regional Board, 2005a). In addition, the proposal included dividing the existing entry "Owens Lake Wetlands" into "Owens Lake Wetlands Below 3600 Feet" and "Owens Lake Wetlands Above 3600 Feet" to clarify that the MUN designation would not apply to wetlands and other surface waters below the historic shoreline of Owens Lake. These proposed Basin Plan amendments were approved by the Regional Board in July (2005b) and by the State Water Resources Control Board in October (SWRCB, 2005), and final approval from the U.S. Environmental Protection Agency is pending.

Existing Water Quality

As a terminal lake, Owens Lake had high salinity even before diversions from the Owens River and other streams draining to the lake began in the late 1800's. In a USGS study (Smith and Bischoff 1993, as cited in Regional Board, 2005a) the salinity of the lake in 1872 was estimated to be 90,000 milligrams per liter (mg/L). According to a USGS paper in 1920, measured concentrations of total dissolved solids (TDS) in Owens Lake between 1890 and 1914 ranged from 16,000 to 240,000 mg/L (Williams 2002, as cited in Regional Board, 2005a)[5].

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[5] For reference, the concentration of TDS in sea water is generally around 35,000 mg/L. In drinking water, TDS are regulated since they may adversely affect the taste, odor or appearance of drinking water. Per California drinking

In addition to high salinity, water quality in the Owens Lake exhibits high concentrations of arsenic[6]. Arsenic is a naturally occurring constituent from geothermal sources in the headwaters, and becomes concentrated through evaporation. A summary of water quality characteristics of water features draining to or located within the Owens Lake bed is provided below.

- **Lower Owens River –** The mean TDS concentration measured over a 10-year period from portions of the Owens River upstream of the River Intake was less than approximately 300 mg/L (Hollett et al. 1991, as cited in GBUAPCD, 1997). TDS concentrations in downstream reaches of the River are generally higher than in the upstream reaches. In a study conducted by Inyo County in 1995 and 1996 (as cited in LADWP, 2004a), average TDS values in the River were 178 mg/L at Mazourka Canyon Road, 421 mg/L near Keeler gage, and 603 mg/L at the proposed LORP pump station site. In a study conducted in 1999 by Inyo County (as cited in LADWP, 2004a), TDS values in the River were around 600 mg/L near the pump station site and 300 to 600 mg/L near Keeler gage.
- **Other Stream Flows –** Average TDS concentrations in runoff from the Coso and Inyo Mountains have been reported as 508 and 532 mg/L, respectively (GBUAPCD, 1997).
- **Seeps and Springs / Groundwater –** The groundwater quality beneath the lake bed can be classified as non-potable, due in part to high TDS concentrations (GBUAPCD, 1997). Deep groundwater discharged from the seeps, springs and wells along the lake margin is generally brackish (TDS values in the 1,000 to 6,000 mg/L range), with locations in the north typically having lower TDS concentrations than those in the south (GBUAPCD, 1997). Brackish water is found in all of the aquifers underlying the top lake bed clay layer (GBUAPCD, 1997). Arsenic concentrations in deep wells have been reported to be generally less than 40 micrograms per liter (μg/L) but range up to 790 μg/L (November 2002 reports by Sierra Geosciences prepared for GBUAPCD, as cited in Regional Board, 2005a). Water quality in shallow groundwater is generally poor. In a GBUAPCD sampling of shallow groundwater in May to June of 2001, TDS concentrations ranged from approximately 40,000 to 114,000 mg/L, and arsenic concentrations ranged from approximately 11,000 to 164,000 μg/L (Regional Board, 2005a).
- **Dust Mitigation Program Areas –** Water applied to the dust control areas comes from the Aqueduct, which is fed by runoff from the eastern slopes of the Sierra Nevada mountains. Water applied to shallow flooding areas is recirculated, with freshwater added to compensate for evaporation and infiltration losses. In samples collected from Aqueduct spillgates located north of the lake, average TDS concentrations ranged from 119 to 129 mg/L in the 1995/1996 Inyo County study (as cited in LADWP, 2004a) and from 220 to 230 mg/L in a study conducted in April 2002 (Inyo County and LADWP,

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water regulations, the secondary maximum contaminant levels for TDS are 500 mg/L (recommended), 1,000 mg/L (upper), and 1,500 mg/L (short-term) (California Code of Regulations, Title 22, Division 4, Chapter 15, Article 16).

[6] For reference, per federal drinking water regulations, the new arsenic maximum contaminant level of 10 μg/L becomes effective on January 23, 2006 (66 Federal Register 6976-7066). Arsenic is regulated since ingestion can pose a risk of cancer.

2004). In the April 2002 study, arsenic concentrations in the Aqueduct were approximately 25 μg/L (Inyo County and LADWP, 2004). TDS concentrations in surface water in Zone 2 shallow flooding areas ranged from 6,000 to 150,000 mg/L (LADWP, 2004b).

- **Brine Pool** – Concentrations of TDS in the brine pool are estimated to range from 250,000 to 400,000 mg/L, depending on the seasonally-variable freshwater inputs (GBUAPCD, 1997). When storm flows partially refill the brine pool, TDS concentrations range from 120,000 mg/L to over 200,000 mg/L (GBUAPCD, 2003). In an unpublished study by the Regional Board and CDFG in 2001, the concentration of TDS in the brine pool was reported to be 430,000 mg/L (Regional Board, 2005a). In a study conducted in support of the NPDES permit application for U.S. Borax facilities, concentration of arsenic in the brine pool was reported as 110,000 μg/L (Regional Board, 2005a).
- **Owens River Delta Outflows** – There are limited water quality data for Delta outflows. In the unpublished study by the Regional Board and CDFG in 2001, the concentration of TDS in the "wetland runoff" was reported to be 1,000 mg/L, and arsenic concentration was below the reporting limit of 0.2 micrograms per gram (μg/g) (Regional Board, 2005a). The concentration of TDS in the "runoff pool" was reported to be 28,500 mg/L, and the concentration or arsenic was 9 μg/g (Regional Board, 2005a). Natural runoff pools on the Owens Lake playa dissolve surface salts and become more saline through evaporation (Regional Board, 2005a).

3.2.3 Biological Resources

3.2.3.1 General Biological Resources

Vegetated Areas

Due to the arid and saline conditions, the majority of the lake bed is devoid of vegetation or sparsely vegetated. Vegetation is present primarily in the Delta, around the seeps and springs located along the lake bed margin, and in the managed vegetation areas where saltgrass has been planted as part of the Dust Mitigation Program. The boundary between wetland vegetation and surrounding desert scrub or bare playa is typically stark, with little transition area (GBUAPCD, 1997). Wetland / riparian plant community types present in the Owens Lake area include Alkali Seep, Modoc-Great Basin Cottonwood-Willow Riparian Forest, and Transmontane Alkali Meadow[7] (GBUAPCD, 1997). The upland areas along the margin of and surrounding the lake bed generally consist of the Shadscale Scrub community (GBUAPCD, 1997). Detailed descriptions of species found in the Alkali Seep, Modoc-Great Basin Cottonwood-Willow Riparian Forest, and Transmontane Alkali Meadow are provided in the EIR for the SIP (GBUAPCD, 1997; GBUAPCD, 2003).

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[7] In the LORP Final EIR (LADWP, 2004a), different names are used to describe the wetland/riparian vegetation types based on a study that focused specifically on the Owens River Delta. The classification used in the GBUAPCD 1997 EIR is based on a study of vegetation types present in the Owens Lake area as a whole.

Most of the vegetated areas on the lake bed consist of the Alkali Meadow community, which is comprised of various plant species that tolerate soil conditions ranging from permanently saturated to relatively dry (GBUAPCD, 1997). Species diversity decreases with distance from water sources, and in areas farthest from available water sources, vegetation is usually composed of a single species, inland saltgrass (*Distichlis spicata*) (GBUAPCD, 1997).

Approximately 2,400 acres of managed vegetation areas for dust control have been developed in the southeastern portion of the formerly unvegetated portions of the lake bed playa. These areas consist of irrigation fields that have been planted with saltgrass. A subsurface drip irrigation system is used to supply water to the fields. Depending on the density of saltgrass, the nature of the landscape and surrounding area, and the level of human disturbance, the managed vegetation areas may support some of the wildlife species observed in the Transmontane Alkali Meadow community or unvegetated playa of the lake bed.

Unvegetated Playa

Most of the Owens Lake bed consists of unvegetated playa areas covered with salt crusts and sand. Portions of the unvegetated playa are wetted perennially or seasonally from natural water sources, including discharges from seeps and springs or outflows from the Delta (see **Section 3.2.2.2**). These areas serve as wildlife habitat, primarily for invertebrates and shorebirds and other birds that feed on the invertebrates. There are no fish, reptile or amphibian species that are known or expected to occur on the unvegetated playa.

In addition, as described in **Section 3.2.2.2**, shallow flooding for dust control is implemented in large portions of the unvegetated playa areas from October 1 to June 30 each year. Since the first phase of the Dust Mitigation Program began in January 2002, the shallow flooding areas have resulted in creation of extensive shorebird habitat, including ponds and shallow pools with saturated perimeter mudflats, all within areas of open playa (LADWP, 2004b).

Invertebrates

Invertebrates known to occur in the unvegetated playa habitat include at least four species of tiger beetles (*Cicindela* species), alkali flies (Family Ephydridae, also called brine flies), midges (Family Chironomidae), water boatmen (Family Corixidae), water scavenger beetles (Family Hydrophilidae), soldier flies (Family Stratiomyidae), predaceous diving beetles (Family Dytiscidae), backswimmers (Family Notonectidae), biting midges (Family Ceratoponidae), and horse flies (Family Tabanidae) (GBUAPCD, 1997).

Alkali flies are abundant in areas where spring mounds and freshwater streams discharge into alkaline playa habitats; they play an important role as the dominant consumer species in these habitats, and serve as an essential food source to a majority of the shorebirds and waterfowl using standing water on the playa (GBUAPCD, 1997). Since implementation of the Dust Mitigation Program the shallow flood areas have been colonized by invertebrates and have shown high production of alkali flies (LADWP, 2004b). Species of alkali flies that serve as primary prey for waterbirds include *Ephydra hians* and *Ephydra auripes* (LADWP, 2004b). *Ephydra hians* occurs at higher salinities (optimal 25,000 to 75,000 mg/L), and *Ephydra auripes* is present at lower salinities (optimal 15,000 to 20,000 mg/L) (LADWP, 2004b).

The following descriptions of the biology of *Ephydra hians* are taken from various references, including the Mono Basin EIR (SWRCB, 1993) and studies conducted at the Owens Lake (Herbst, 1997; Herbst, 1998; Herbst, 1999; Herbst, 2001a; Herbst, 2001b). Adult females lay eggs in the summer on benthic algal mats or other substrate (e.g., rocks, submerged vegetation). They lay a daily average of approximately 10 eggs over a 2-week period. Eggs hatch in 1 to 3 days into larvae, which undergo a series of development phases (first, second and third instars). Larval development ranges from 4 weeks to more than 5 months, depending on temperature, salinity and food availability; larvae can survive near zero temperatures. Laboratory studies show that growth and development at 20 ˚C usually require a total of 25 days. Mature larvae attach to the underside of a rock or other substrate to pupate. Pupae cannot survive long at water temperatures below 5 ˚C. The non-feeding, inactive pupa emerges as an adult fly within 1 to 3 weeks, depending on temperature. At 20 ˚C, pupation time is 13 days. Normal adult life span is 10 to 14 days, but overwintering adults may survive for months. Increasing water temperatures in spring cause rapid growth and development of overwintering larvae and increase rates of development, increasing the fly population during spring. The population remains abundant through the summer, until declining temperatures and shortened photo-period in autumn cause adult flies to cease laying eggs. Pupal densities are highest in early autumn. Population density drops rapidly in October when cooling temperatures cause high moralities of all lifestages. In Mono Lake, densities of larvae and pupae are much higher on hard substrates (e.g., rocks) than soft substrates (e.g., algal mats) due to better protection from wind and waves. Benthic algae (composed of diatoms, filamentous green algae, blue-green algae, and perhaps various bacteria and protozoa associated with detritus) are the food sources for adult and larval alkali flies. Alkali flies are well adapted to high salinities. However, high salinities have a negative effect on larval growth and development rates, survivorship and pupation success.

Birds

Portions of the unvegetated playa that are wetted from seeps and springs, outflows from the Delta, and the Dust Mitigation Program serve as habitat for many species of birds, particularly shorebirds and other waterbirds[8]. The largest number of waterbirds are observed during the spring and fall migration periods. Spring migrants are present from late February to early June, with peak populations typically present in late April; fall migrants are present from late July or early August to the end of October). More than 80 species of waterbirds have been observed during the spring and fall migration surveys since 1999 (PRBO, 2003). Specifically for shorebirds, the peak spring migration period is mid-April to early May, and the peak fall migration period is late August to early September (observations by LADWP Watershed Resources staff; Skagen et al., 1999).

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[8] The term waterbirds is used to refer to shorebirds, waterfowl, wading birds and other birds that are generally associated with open water and marsh habitats. The term shorebirds is used to refer to members of the order Charadriiformes, excluding the web-footed seabirds [such as gulls and terns (Laridae) and auks (Alcidae)], and includes sandpipers, phalaropes, plovers, avocets and stilts. The term waterfowl is used to refer to members of the order Anseriformes, and includes ducks and geese. The term wading birds is used to refer to long-legged birds such as herons, egrets and ibis that wade in water to search of food.

Prior to start of the Dust Mitigation Program in 2002, areas with the largest numbers of birds observed in the fall were Cottonwood Marsh, the Delta, Cartago Springs[9], Dirty Socks Well, Sulfate Well East and West, and Northwest Seep; areas with the largest numbers of birds in the spring were the Delta, Northwest Seep, Cartago Springs, Dirty Socks Well, Sulfate Well East and Cottonwood Marsh (PRBO, 2001a). Since the shallow flood areas for the Dust Mitigation Program became established in 2002 and 2003, the shallow flood areas have become the predominant areas used by migrating waterbirds, sometimes supporting 95 percent or more of the lake-wide population at any given time (LADWP, 2004b). The lake-wide population of waterbirds has increased substantially since implementation of the Dust Mitigation Program. The mean numbers of water birds at Owens Lake were approximately 5,500 in the spring of 2002 and approximately 8,900 in the spring of 2003 (PRBO, 2003).

Birds that are known to occur on or near the wetted playa include (GBUAPCD, 1997; LADWP, 2004a; LADWP, 2004b; PRBO, 1999; PRBO, 2000; PRBO, 2001a; **Appendix B**):

- Resident, migratory, or wintering shorebirds that feed on invertebrates present on the wet playa and/or use the area for roosting (e.g., black-bellied plover, snowy plover, semipalmated plover, killdeer, black-necked stilt, American avocet, greater yellowlegs, lesser yellowlegs, willet, spotted sandpiper, whimbrel, long-billed curlew, marbled godwit, western sandpiper, least sandpiper, dunlin, ring-billed gull, and California gull)
- Shorebirds that nest in or near wet unvegetated playa (e.g., snowy plover, American avocet, and black-necked stilts)

  Western snowy plovers are discussed below in **Section 3.2.3.2**. American avocets are known to nest in large numbers on the Owens Lake bed, mostly in the shallow flood dust control areas; 157 nests were found in 2002, and over 500 nests were found in 2003 (LADWP, 2004b; PRBO, 2003). Compared to snowy plovers, avocets use deeper and larger ponds and tolerate some vegetation around nest sites (areas with saltgrass or wet meadow areas) (LADWP, 2004b). Black-necked stilts are known to nest in small numbers in or near American avocet colonies in shallow flood areas and other areas of the lake (LADWP, 2004b). American avocets and black-necked stilts are not known to and are not expected to nest in the brine pool transition area under current hydrologic conditions.

- Birds of prey (e.g., prairie falcon) that fly over the playa in transition to other habitats or to look for prey birds
- Passerines and other birds that fly over the playa to feed on flying insects (e.g., several species of swallows and white-throated swift) or forage on the ground for insects (horned lark)
- Waterfowl (e.g., Canada goose, snow goose, green-winged teal, cinnamon teal, and mallard) that use the area (when sufficient amounts of water are present) primarily for roosting, although some feeding may occur

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[9] In 2004, approximately 218 acres of wetland habitat in Cartago Springs were purchased by the State of California to be managed as a wildlife area.

A list of birds that have been observed specifically in the brine pool transition area (see **Table 3-7**) was compiled from the following sources (a total of 65 survey days between March 1996 and October 2005):

- Data recorded and compiled by D. House, LADWP Watershed Resources specialist (a total of 25 days, consisting of 1 in 2000, 4 in 2001, 5 in 2002, 2 in 2003, and 13 in 2005)
- Data submitted to LADWP by M. Prather, Owens Valley Committee, with a comment letter (dated September 20, 2005) on the NOP for this SEIR (see **Appendix A**)[10] (a total of 37 days, consisting of 2 in 1996, 7 in 1999, 11 in 2000, 11 in 2001, 5 in 2002, and 1 in 2003)
- Data recorded as part of the International Shorebird Survey and submitted by M. Prather, Owens Valley Committee (personal communication to W. Bamossy, LADWP, October 12, 2005) (Of the 16 days of lake-wide surveys conducted from March through September 2005, the brine pool transition area [referred to as the Delta outflow area in the data sheets] was surveyed on 2 days in April and 2 days in May.)

The number of birds observed by species and by date of survey is presented in **Appendix B**. In general, shorebirds (except killdeers) are not present when there is no water in the brine pool transition area. However, the presence of water has not always correlated with the use of the brine pool transition area by shorebirds, especially since the initiation of shallow flood operations.

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[10] Data submitted do not include notations regarding bird behavior (including whether birds included in the counts were observed flying over the brine pool transition area or on the ground).

Table 3-7
List of Bird Species Observed in the Brine Pool Transition Area (1996 – 2005)

Common Name	Scientific Name	Month and Year of Most Recent Observation	No. of Days Observed	
			Total	Since January 2002
Anseriformes (Waterfowl)				
Snow Goose	*Chen caerulescens*	February 2002	4	2
Canada Goose	*Branta canadensis*	December 2000	1	0
Mallard	*Anas platyrhynchos*	November 2005	3	2
Cinnamon Teal	*Anas cyanoptera*	May 1996	1	0
Northern Pintail	*Anas acuta*	May 1996	1	0
Unidentified duck species	---	April 2005	5	3
Ciconiiformes (Storks and relatives)				
Snowy Egret	*Egretta thula*	May 1996	1	0
Falconiformes (Diurnal birds of prey)				
Northern Harrier*	*Circus cyaneus*	February 2002	1	1
Peregrine Falcon*	*Falco peregrinus*	August 2000	2	0
Prairie Falcon*	*Falco mexicanus*	August 2005	2	1
Charadriiformes (Shorebirds and relatives)				
Black-bellied Plover	*Pluvialis squatarola*	May 2002	7	2
Snowy Plover*	*Charadrius alexandrinus*	April 2005	18	5
Semipalmated Plover	*Charadrius semipalmatus*	April 2005	7	3
Killdeer	*Charadrius vociferus*	May 2005	14	2
Black-necked Stilt	*Himantopus mexicanus*	May 2005	5	1
American Avocet	*Recurvirostra americana*	May 2005	19	6
Greater Yellowlegs	*Tringa melanoleuca*	April 2005	7	2
Solitary Sandpiper	*Tringa solitaria*	August 2000	3	0
Willet	*Catoptrophorus semipalmatus*	May 2002	3	1
Spotted Sandpiper	*Actitis macularius*	May 2002	1	1
Whimbrel	*Numenius phaeopus*	April 2000	1	0
Long-billed Curlew*	*Numenius americanus*	April 2000	6	0
Unidentified Turnstone species	*Arenaria* sp.	August 1999	1	0
Western Sandpiper	*Calidris mauri*	May 2002	10	3
Least Sandpiper	*Calidris minutilla*	April 2005	17	7
Baird’s Sandpiper	*Calidris bairdii*	September 1999	1	0
Pectoral Sandpiper	*Calidris melanotos*	May 2002	2	1
Dunlin	*Calidris alpina*	January 2002	3	1
Unidentified *Calidris* species / Western and/or Least Sandpiper	*Calidris* sp.	May 2002	13	2
Long-billed Dowitcher	*Limnodromus scolopaceus*	March 1996	1	0
Unidentified Dowitcher species	*Limnodromus* sp.	April 2000	5	0
Red-necked Phalarope	*Phalaropus lobatus*	September 1999	2	0
Unidentified Phalarope species	*Phalaropus* sp.	May 2000	3	0
California Gull*	*Larus californicus*	August 2005	10	10

Table 3-7 (Continued)
List of Bird Species Observed in the Brine Pool Transition Area (1996 – 2005)

Common Name	Scientific Name	Month and Year of Most Recent Observation	No. of Days Observed	
			Total	Since January 2002
Apodiformes (Hummingbirds and Swifts)				
White-throated Swift	*Aeronautes saxatalis*	April 2002	1	1
Passeriformes (Perching birds)				
Western Kingbird	*Tyrannus verticalis*	August 2005	1	1
Common Raven	*Corvus corax*	September 2005	2	2
Horned Lark	*Eremophila alpestris*	November 2005	7	7
Tree Swallow	*Tachycineta bicolor*	April 2002	1	1
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	June 2005	2	2
Cliff Swallow	*Petrochelidon pyrrhonota*	April 2002	1	1
Barn Swallow	*Hirundo rustica*	October 2005	4	4
Unidentified swallow species	---	April 2002	1	1
American Pipit	*Anthus rubescens*	November 2005	1	1
Savannah Sparrow	*Passerculus sandwichensis*	June 2005	3	3

List compiled from data recorded by LADWP and M. Prather, Owens Valley Committee between 1996 and 2005. See additional explanation above this table and in **Appendix B**.

Note: Shaded cells in the table indicate species that have been observed since the first phase of shallow flooding became operational in January 2002.

* See **Section 3.2.3.2** for additional discussion on special status species.

<u>Mammals</u>

The unvegetated playa offers little in the way of resources for mammals due to lack of vegetation and other types of cover or forage (GBUAPCD, 1997). Some mammals (carnivores, tule elk, and bats) may occur on or over the unvegetated playa as they travel between other types of habitats (GBUAPCD, 1997). Coyotes (or their tracks) have been detected during snowy plover surveys of the dust control project areas (PRBO, 1999; PRBO, 2000; PRBO, 2001b; PRBO, 2002; PRBO, 2003).

Brine Pool

Due to lack of vegetation and freshwater supply, the brine pool generally does not provide habitat for plants or wildlife other than for temporary roosting to avoid disturbance (e.g., predation and hunting [by humans]). In portions of the brine pool adjacent to vegetated communities, birds or other wildlife that use the adjacent communities may pass through the brine pool area. Areas of the brine pool that receive freshwater discharged from the Delta or seeps/springs (e.g., Sulfate Well, Ash Creek/Permanente Seeps, Cottonwood Springs) provide habitat similar to unvegetated playa discussed above. Standing water present in the brine pool is too saline for vegetation or algae or aquatic invertebrates; salt-tolerant bacteria (halobacteria) are present. Microbes that derive energy from arsenic were recently discovered in Searles Lake, located in the eastern Sierra Nevada (ISSLR, 2005) under similar conditions to the Owens Lake brine pool.

3.2.3.2 Special Status / Sensitive Species

Many special status species are known to occur in the Owens Lake area, primarily in the vegetated habitats. Special status species that are known or have the potential to occur in the vegetated habitats are described in the EIR for the SIP (GBUAPCD, 1997; GBUAPCD, 2003).

Special status species that are known or have the potential to occur on the unvegetated playa, including areas that are influenced by outflows from the seeps/springs and the Delta (brine pool transition area) and shallow flooding areas, are discussed below. These species were identified based on review of previous EIRs for projects located on the lake bed (GBUAPCD, 1997; GBUAPCD, 2003; LADWP, 2004a; Inyo County, 2004a) and other biological surveys conducted on the lake bed (PRBO, 1999; PRBO, 2000; PRBO, 2001a; PRBO, 2001b; PRBO, 2002; PRBO, 2003; PRBO, 2004; PRBO, 2005; LADWP, 2004b; BioEnvironmental Associates, 2005) as determined to be relevant for the habitat type of the brine pool transition area by LADWP Watershed Resources specialists. No plants, fish, reptiles or amphibians with special status are known or expected to occur on the unvegetated playa areas of the Owens Lake bed (including the brine pool transition area).

Listed Species

Listed species are those provided legal protection under the federal Endangered Species Act and/or the California Endangered Species Act. American peregrine falcon (*Falco peregrinus anatum*), a species listed as Endangered under the California Endangered Species Act and a Fully Protected Species per the California Fish and Game Code, is the only listed species known or with the potential to occur in the unvegetated playa areas of the Owens Lake bed. The Threatened species status for the western snowy plover under the federal Endangered Species Act applies only to the Pacific coast population (USFWS, 1999); western snowy plovers are discussed below as a CDFG Species of Special Concern.

The American peregrine falcon's range includes most of California, except in deserts, during migrations and in winter. The California breeding range includes the Channel Islands, coast of southern and central California, inland north coastal mountains, Klamath and Cascade ranges, and the Sierra Nevada (CDFG, 2003c). Nesting sites are typically on ledges of large cliff faces, but some pairs nest on buildings and bridges (CDFG, 2003c). Nesting and wintering habitats are varied, including wetlands, woodlands, other forested habitats, cities, agricultural areas and coastal habitats (CDFG, 2003c). Peregrine falcons feed on birds that are caught in flight (CDFG, 2003c).

American peregrine falcons migrate through the Owens Valley in spring and fall in association with the waterfowl and shorebirds that migrate through the area. Known occurrences of this species in the Owens Lake area include the playa near Cartago Creek in March 1996 (GBUAPCD, 1997), Zone 1 shallow flooding area in April 2005, Zone 2 shallow flooding area in April 2005 (two occasions), and at Dirty Stocks in August 2005 (data provided by M. Prather, Owens Valley Committee, see **Appendix B**). No peregrine falcons were observed during the spring 2003 survey for the SIP EIR (GBUAPCD, 2003).

A peregrine falcon was observed in the brine pool transition area in May 2000 and August 2000; this species has not been detected in the area in subsequent surveys (see **Table 3-7** in **Section 3.2.3.1**). Suitable nesting sites (cliffs, building, or bridges) for the peregrine falcon are absent in the brine pool transition area.

Species of Special Concern

Species of Special Concern status is designated by the CDFG to animal species that are not listed under the federal or California Endangered Species Act, but are declining at a rate that could result in listing or historically occurred in low numbers and known threats to their persistence currently exist (CDFG, 2003a). The list of Species of Special Concern is intended for use as a management tool and for information, and Species of Special Concern have no special legal status (CDFG, 2003b). Many of the species on the list are common migrants through California, and, for most species on the list, it is primarily the breeding population that is of special concern (CDFG, 2003b).

The list of Species of Special Concern is divided into the following three categories (CDFG, 2003b; CDFG, 2005):

- Highest Priority – Species that face immediate extirpation of their entire California population or their California breeding population if current trends continue
- Second Priority – Species that are definitely on the decline in a large portion of their range in California, but their populations are still sufficiently substantial that danger is not immediate
- Third Priority – Species that are not in any present danger of extirpation whose populations do not appear to be declining seriously within most of their range

The following Species of Special Concern are known to or have the potential to occur in unvegetated playas of the lake bed and are described in detail below (the priority category for each species is indicated based on CDFG, 2003b):

- White-faced Ibis (*Plegadis chihi*) – Highest Priority (rookery site)
- Osprey (*Pandion haliaetus*) – Second Priority (nesting)
- Northern Harrier (*Circus cyaneus*) – Second Priority (nesting)
- Ferruginous Hawk** (*Buteo regalis*) – Addition to list, no priority category (wintering)
- Prairie Falcon (*Falco mexicanus*) – Third Priority (nesting)
- Burrowing Owl (*Athene cunicularia*) – Second Priority (burrow sites)
- Western Snowy Plover* (*Charadrius alexandrinus nivosus*) – Second Priority (nesting)
- Mountain Plover* (*Charadrius montanus*) – Addition to list, no priority category (wintering)
- Long-billed Curlew* (*Numenius americanus*) – Addition to list, no priority category (nesting)
- California Gull (*Larus californicus*) – Third Priority (nesting colony)
- Spotted Bat (*Euderma maculatum*) – Addition to list, no priority category

The western snowy plover is the only Species of Special Concern that is known that has the potential to use the unvegetated playa for nesting.

Species listed above with one or two asterisks (*) are those on the Audubon WatchList (National Audubon Society, 2002), which is a synthesis of species assessments compiled by BirdLife International and Partners In Flight. One asterisk indicates species on the WatchList red category (species that are "declining rapidly, have very small populations or limited ranges, and face major conservation threats"). Two asterisks indicate species on the WatchList yellow category (species that are "declining but at a slower rate than those in the red category").

White-faced Ibis

The white-faced ibis is considered a common migrant in the Owens Valley (Appendix D in LADWP, 2004a). It prefers to feed in freshwater emergent wetlands, shallow lacustrine waters, and muddy ground of wet meadows and irrigated or flooded pastures and croplands (CDFG, 1983). It feeds on earthworms, insects, crustaceans, amphibians, small fishes, and miscellaneous invertebrates (CDFG, 1983). It probes deep in mud with its long bill, and also feeds in shallow water or on the water surface (CDFG, 1983). Nesting habitat is dense, freshwater emergent wetland (CDFG, 1983). This species is not expected to breed at Owens Lake (GBUAPCD, 1997), but occurs consistently at ponds and marshes near Owens Lake seeps and springs during the spring and fall migration periods (GBUAPCD, 2003; PRBO, 2003). It was observed in playa habitat at Cartago Creek and Sulfate Well in the fall of 1995 and at North Seep in 1996 (GBUAPCD, 1997).

White-faced ibis have not been observed in the brine pool transition area (see **Table 3-7** in **Section 3.2.3.1** and **Appendix B**). This species is seen most frequently in vegetated wetlands and pastures, which are absent in the brine pool transition area. Therefore, use of the brine pool transition area by white-faced ibis is not expected. Suitable nesting sites (emergent wetland) for this species are absent in the brine pool transition area.

Osprey

Ospreys feed primarily on fish but may also take other wildlife including birds and invertebrates (GBUAPCD, 1997). They nest on a platform of sticks at the top of large snags, dead-topped trees, on cliffs, or on human made structures (CDFG, 1983). Ospreys are considered a summer visitor in the Owens Valley (LADWP, 2004a), and are expected uncommonly during migration at Owens Lake (GBUAPCD, 1997). Ospreys are rarely observed in the winter in the Owens Valley. One individual was observed at Owens Lake in the fall of 1995, and another was observed perched on an unidentified object on the playa in the fall of 1996 (GBUAPCD, 1997). This species was not observed during the 2002-2003 sensitive bird surveys (GBUAPCD, 2003).

Ospreys have not been observed in the brine pool transition area (see **Table 3-7** in **Section 3.2.3.1** and **Appendix B**). This species is not expected to use the brine pool transition area since it feeds primarily on fish (which are absent in the transition area) and suitable roosting and nesting sites (trees) for ospreys are also absent in the brine pool transition area.

Northern Harrier

Northern harriers frequent meadows, grasslands, desert sinks, and freshwater emergent wetlands, and nest in shrubby vegetation usually on the edge of, or in, marshes (CDFG 1990a, as cited in GBUAPCD, 1997). Harriers predominantly feed on small mammals, mainly, *Microtus* (vole) species, but may also feed on reptiles, amphibians, birds and invertebrates (California Partners in Flight, 2000). Northern harriers are considered resident in the Owens Valley (LADWP, 2004a) and are occasionally observed hunting at Owens Lake. This species was found in marsh areas (nesting and hunting) during the 1995-1996 and 2002 surveys at the Delta, Keeler Ponds and Swedes Pasture; individuals or their nests were not observed in the dust control project areas during the spring 2003 surveys (GBUAPCD, 2003).

Two northern harriers were observed in the brine pool transition area in February 2002; this species has not been detected in the area in subsequent surveys (see **Table 3-7** in **Section 3.2.3.1** and **Appendix B**). Suitable nesting sites (shrubby vegetation adjacent to or in marshes) for the northern harrier are absent in the brine pool transition area.

Ferruginous Hawk

Ferruginous hawks search for prey from low flights over open, treeless areas, and glide to intercept prey on the ground, and also hover and hunt from high mound perches (CDFG, 1983). They feed mostly on lagomorphs (rabbits and hares), ground squirrels, and mice, but also take birds, reptiles, and amphibians (CDFG, 1983). This species is not known to breed in California (CDFG, 1983). It is considered a fall migrant and winter visitor in the Owens Valley (LADWP, 2004a). This species was observed near Dirty Socks Well and the Delta during the 1995-1996 and 2002 bird surveys for the dust control project, but was not observed in the dust control project area during the spring 2003 survey (GBUAPCD, 2003).

Ferruginous hawks have not been observed in the brine pool transition area (see **Table 3-7** in **Section 3.2.3.1** and **Appendix B**). This species is not known to breed in California, and suitable nesting sites (cliffs, trees or other elevated structures) are absent in the brine pool transition area. While the brine pool transition area is an open habitat preferred by ferruginous hawks in the winter, the area does not support mammalian prey species preferred by ferruginous hawks. Therefore, ferruginous hawks are not expected to use the brine pool transition area.

Prairie Falcon

Prairie falcons feed mostly on small mammals, some small birds, and reptiles (CDFG, 1983). It catches prey in air and on ground in open areas (CDFG, 1983). It nests on sheltered ledges of cliffs, bluffs or rock outcrops (CDFG, 1983). This species was observed in marsh and meadows of the Delta and seeps and springs during the 1995-1996 surveys, and was observed flying over the playa at Cottonwood Springs in 1995 (GBUAPCD, 1997). It is a year-round resident in the Owens Valley (LADWP, 2004a). It was not observed during the 2002-2003 survey for the dust control project (GBUAPCD, 2003).

A prairie falcon was observed in the brine pool transition area in January 2000; another individual was observed flying over the area in August 2005 (see **Table 3-7** in **Section 3.2.3.1** and **Appendix B**). Suitable nesting sites (cliffs / rock outcrops) for the prairie falcon are absent in the brine pool transition area.

Burrowing Owl

Burrowing owls nest and take cover in abandoned mammal burrows in habitat that includes open, well-drained grasslands, steppes, deserts, prairies and agricultural lands (Haug 1993, as cited in GBUAPCD, 1997). They hunt from low perches, and eat mostly insects and occasionally small mammals, reptiles, and birds (GBUAPCD, 1997). GBUAPCD has documented burrowing owl use of dust control pipes (GBUAPCD, 2003).

Burrowing owls have not been observed in the brine pool transition area (see **Table 3-7** in **Section 3.2.3.1**). This species is not expected to occur in the brine pool transition area since the substrate is not suitable (high alkalinity and high moisture content) for burrow construction by this species, or by mammals whose burrows the owls may utilize.

Western Snowy Plover

The Owens Lake bed has historically been used by nesting western snowy plovers., Both the number of adults and nests have increased substantially since implementation of the Dust Mitigation Program. At Owens Lake, the nesting season for snowy plovers begins in March, with the majority of nests found in May and June (LADWP, 2004b). With implementation of the Dust Mitigation Program, nesting season has become longer; in 2003, the chick-fledging period extended into September for nests established in July (LADWP, 2004b). Migration to wintering areas (coastal or inland areas of Southern California or Baja California) typically begins in July and extends into October and probably November in some years (LADWP, 2004b). Small numbers have been found occasionally at Owens Lake in winter (LADWP, 2004b).

At inland sites, western snowy plovers primarily forage on alkali fly (*Ephydra* species) larvae, pupae and adults (LADWP, 2004b). Snowy plovers are primarily visual foragers, using the run-stop-peck method of feeding that is typical of *Charadrius* species (USFWS, 2001). They forage in the wet sand, on salt pans, on spoil sites, and along the edges of salt marshes, salt ponds, and lagoons; they sometimes probe for prey in the sand and pick insects from low-growing plants (USFWS, 2001).

At Owens Lake, optimal breeding habitat for snowy plovers appears to be open, dry lakebed within 0.5 mile of springs, seeps, outflows or shallow flooding that support invertebrate production (LADWP, 2004b). Plovers avoid areas with any but sparse vegetation, but they do prefer some topographic or substrate color variability to obscure nest sites if there is good visibility around the nest (LADWP, 2004b). Snowy plovers require a water source to support invertebrate production for forage, and possibly also for drinking, although adults may be able to meet water requirements from their food supply alone (LADWP, 2004b). However, nesting can occur as much as 0.7 miles or more from the nearest water source on the lake bed (LADWP, 2004b).

Since the 1980s, surveys for snowy plover and other shorebirds have been conducted at the Owens Lake by several organizations. Surveys for snowy plover have been conducted annually during the breeding season since 1999 by the Point Reyes Bird Observatory (PRBO) for

LADWP in connection with the Dust Mitigation Program (PRBO, 1999; PRBO, 2000; PRBO, 2001b; PRBO, 2002; PRBO, 2003; PRBO, 2004; PRBO, 2005). **Table 3-8** compares the estimated number of adult snowy plovers based on lake-wide surveys conducted in May from 2001 through 2005.

Lake-wide, the number of adult snowy plovers has increased substantially since operation of the Zone 2 shallow flood area began in January 2002. Since 2002, approximately 50 percent of the total number of snowy plovers has been found in the Zone 2 shallow flood area, which is the largest of the shallow flood areas. Since 2003, 13 to 28 percent has been found in the Zone 1 shallow flood area, and 15 to 29 percent has been found in the non-dust control areas (seeps, springs and the Delta). The number of snowy plovers observed in the non-dust control areas has been relatively stable since 2002, ranging between 114 and 144.

Prior to implementation of the Dust Mitigation Program, snowy plovers have been found to nest on the lake bed near seeps and springs and other outflow areas, including the outflows of Sulfate Well, Hutchinson Flowing Well, North Keeler Seeps, Tubman Springs, Swede's Pasture Springs, Cartago Creek outflow area, Dirty Socks Well, and the Delta (PRBO, 1999; PRBO, 2000; PRBO, 2001b). (Note: Hutchinson Flowing Well and North Keeler Seeps are not part of the Zone 2 shallow flood area.) Since implementation of the Dust Mitigation Program, large numbers of nests and broods have been found at shallow flood areas, particularly the Zone 2 shallow flood area (PRBO, 2002; PRBO, 2003; PRBO, 2004). In 2004, most of the broods were found in shallow flood areas, which accounted for 72 percent of the total, compared with 42 percent in 2003 and 45 percent in 2002 (PRBO, 2004).

Based on 25 days of data recorded and compiled by D. House, LADWP Watershed Resources specialist, two snowy plovers were observed on one survey date (December 2000) in the brine pool transition area (see **Appendix B**). Based on data submitted by M. Prather, snowy plovers have been observed in the brine pool transition area nearly every year, primarily from March to May (beginning to middle of breeding season) and occasionally in the winter (**see Table 3-9** and **Appendix B**). They have not been observed in the brine pool transition area when there are no outflows from the Delta (see **Appendix B**). In 1999, 2000, 2001, and 2002, relatively small numbers of snowy plover nests and/or broods were found in or outside the southwestern margin of the Delta (the current Zone 1 shallow flood area) and south of the Delta in or near the brine pool transition area (PRBO, 1999; PRBO, 2000; PRBO, 2001b; PRBO, 2002). However, it should be noted that in 2001 and 2002, snowy plovers nesting near the Delta may have been using the construction dewatering area (in association with construction of the Zone 1 shallow flood area) as the nearest water source rather than the outflows from the Delta. In 2003, no snowy plover nests were recorded in the brine pool transition area (PRBO, 2003), though this area was not part of the intensive search area for nests. In 2004 and 2005, surveys for nests were not conducted; surveys for adults and broods were conducted but the search area did not specifically include the brine pool transition area (PRBO, 2004; PRBO, 2005). Since operation of the Zone 2 shallow flood area began in the beginning of 2002, snowy plover nests have not been observed in the brine pool transition area, presumably due to the large expanse of more preferred nesting habitat created by the shallow flooding.

Table 3-8
Total Population of Snowy Plovers at Owens Lake
(Lake-Wide Surveys Conducted in May, 2001 – 2005)

Area	2001	2002	2003	2004	2005
West Shore (Non-Dust Control Project Areas)(1)	58	56	58	78	48
East Shore (Non-Dust Control Project Areas)(2)	90	41	37	18	66
Phase 1 Habitat Shallow Flood(3)	--	6	11	48	23
Phase 2 Shallow Flood(4)	--	--	0	4	8
Managed Vegetation(5)	--	--	0	4	0
Zone 2 Shallow Flood(6)	15	152	224	325	259
Zone 1 Shallow Flood(7)	--	--	51	181	71
Owens River Delta(8)	4	17	20	0	30
Total	**167**	**272**	**401**	**658**	**505***

Source: LADWP, 2004b; PRBO, 2003; PRBO, 2005.

(1) Includes Northwest Seep, Bartlett/Carroll Creek, North Cottonwood, South Cottonwood, Permanente/Ash Creek, Cartago Creek, and Olancha Pond (2005 only).

(2) Includes Sulfate Well East and West, Swede's Pasture Springs, North Tubman Seep (not surveyed in 2001), Tubman Springs, Whiskey Creek (not surveyed in 2001), Dirty Socks Well, and Southwest Seep. Labeled as Zones 3/4 Non-Project Areas in PRBO, 2005.

(3) Operation of the Phase 1 habitat shallow flood area began in March 2003.

(4) Operation of the Phase 2 shallow flood area began in March 2003.

(5) Operation of the managed vegetation area began in July 2002.

(6) Operation of the Zone 2 shallow flood area began in January 2002. In May 2001, the surveyed areas consisted of North Keeler Seep, Keeler Seep, and Hutchinson Well, which are now part of the Zone 2 shallow flood area.

(7) Operation of the Zone 1 shallow flood area began in September 2002.

(8) In 2001 and 2002, included wet areas from Zone 1 dewatering sites.

* The decline in the lake-wide number of snowy plovers observed in 2005 from 2004 is thought to be attributable to several factors, including the earlier survey date in 2005 and a later than usual commencement of breeding season in 2005 (possibly due to inclement weather during migration and the beginning of the breeding season) (PRBO, 2005).

Table 3-9
Number of Snowy Plovers Observed in the Brine Pool Transition Area

1996		1999		2000		2001		2002		2003		2005	
Date	**No.**	**Date**	**No.**	**Date**	**No.**	**Date**	**No.**	**Date**	**No.**	**Date**	**No.**	**Date**	**No.**
3/23	1	8/17		1/3		1/3		1/13	20	1/30		3/28	
5/6	30	8/24	1	3/25	4	4/1	3	2/2	1	8/7		4/1	
		8/29		4/2	9	4/15	16	3/11		10/26		4/3	2
		9/12	1	4/12		4/22	7	4/25				4/11	2
		9/26		4/21	8	5/15		4/26				4/14	
		10/17		5/20	12	5/16		5/3	13			4/29	
		10/23	3	6/3		5/20		5/24				5/1	
				7/24		5/31		6/2				5/8	
				8/1		6/2		8/16				5/13	
				8/14		6/14		10/11				6/2	
				8/22		6/22						6/24	
				12/21	2	8/20						8/4	
						9/1						8/24	
						9/15						9/12	
						10/26						9/26	
												10/12	
												11/16	

Source: Data compiled from data recorded by LADWP and M. Prather, Owens Valley Committee between 1996 and 2005. See additional explanation provided above in **Table 3-7** and in **Appendix B**.
Note: Blank cells indicate surveyed dates when no snowy plovers were observed.

Mountain Plover

Mountain plovers feed primarily on insects such as beetles, grasshoppers, crickets, and ants (USFWS, 2003). Mountain plovers nest in the Rocky Mountain and Great Plains States from Montana south to Mexico (USFWS, 2003); this species is not known to nest in California. California is the primary wintering ground for mountain plovers, supporting up to 95 percent of the U.S. population of mountain plovers (USFWS, 2003). Wintering mountain plovers are found mostly on cultivated fields, but can also can be found on grasslands or landscapes resembling grasslands (USFWS, 2003). Mountain plovers are a rare migrant in the Owens Valley (LADWP, 2004a). Mountain plovers occur on the Owens Lake in small numbers (5 or less) casually each fall and spring at wet playa habitats (GBUAPCD, 2003). Four mountain plovers were observed feeding on the wet playa at Horse Pasture in December of 1995 (GBUAPCD, 1997). This species was observed during lake-wide surveys in 1999, 2001, and 2002 (PRBO, 2003).

Mountain plovers have not been observed in the brine pool transition area (see **Table 3-7** in **Section 3.2.3.1** and **Appendix B**). This species is not expected to occur in the brine pool transition area since its preferred habitat is dry meadow with some vegetation in more upland areas. This species is not known to breed in California.

Long-billed Curlew

Long-billed curlews use their long bills to probe deep into substrate, or to grab prey from the mud surface, while at times wading in belly-deep water (CDFG, 1983). In inland habitats, it feeds on insects (adults and larvae), worms, spiders, berries, crayfish, snails, and small crustaceans, and occasionally takes nestling birds (CDFG, 1983). In California, it nests on elevated interior grasslands and wet meadows, usually adjacent to lakes or marshes (CDFG, 1983). It is considered a summer visitor in the Owens Valley (LADWP, 2004a). This species was observed at North Seep, Cottonwood Springs, Sulfate Well, northeastern playa, Cartago Creek and Ash Creek Meadows in 1995-1996 (GBUAPCD, 1997). Although this species was not detected during surveys in 2002 and 2003 at dust control project sites (GBUAPCD, 2003), it is observed consistently in lake-wide surveys during the spring and fall migration periods (PRBO, 2003).

Up to 11 individuals of this species were observed in the brine pool transition area in the fall of 1999 and winter/spring of 2000 on 6 survey days; this species has not been detected in the area in subsequent surveys (see **Table 3-7** in **Section 3.2.3.1** and **Appendix B**). Suitable nesting sites for this species (grasslands and wet meadows) are absent in the brine pool transition area. Long-billed curlew are therefore not expected to nest in the brine pool transition area, although this species may occasionally forage in the brine pool transition area during migration.

California Gull

California gulls are omnivorous and feed on garbage, carrion, earthworms, adult insects, and larvae (CDFG, 1983). In inland areas, they frequent lacustrine, riverine, and cropland habitats, landfill dumps, and open lawns in cities (CDFG, 1983). They nest on islands in alkali or freshwater lakes and salt ponds in California (CDFG, 1983), and nests are scrapes lined with grasses, feathers, or rubble, on sparsely vegetated portions of isolated islands (CDFG, 1983). This species nests in large numbers at Mono Lake. This species was observed on wet playa at various seeps and springs around the Owens Lake bed in fall 1995 and spring 1996 (GBUAPCD, 1997). Breeding California gulls were not observed at Owens Lake during directed surveys conducted in spring 1996. In 2002 and 2003, gulls were found foraging in or flying over shallow flood areas (GBUAPCD, 2003). Lake-wide, the number of gulls (predominantly California gulls) observed during the May snowy plover surveys have increased greatly in the last several years, from approximately 100 to 200 in 2002 and 2003 to over 700 in 2004 and over 7,000 in 2005 (PRBO, 2005).

California gulls have been observed in the brine pool transition area on 10 survey days since May 2002 (see **Table 3-7** in **Section 3.2.3.1** and **Appendix B**). In the spring of 2005, when water was abundant in the brine pool transition area, between 10 and 270 individuals were observed (**Appendix B**). During the snowy plover surveys conducted in 2004 and 2005, small numbers of California gulls were documented nesting at Owens Lake; although gull nests were not specifically searched for, none were suspected or detected during surveys from 2001 to 2003 PRBO, 2005). California gulls are not likely to nest in the brine pool transition area since the area is easily accessible to potential predators (e.g., coyotes).

Spotted Bat

The spotted bat prefers to roost in cliffs, and forages over open marshes, fields and riparian corridors, and preys almost exclusively on moths (Barbour and Davis 1969, as cited in GBUAPCD, 1997). This species was encountered foraging over the riparian areas and meadows of the Delta and many of the seeps and springs; it was also found over open playa in the northeast portion of the lake bed, possibly in route to other habitats since it is not known to forage over unvegetated playa (GBUAPCD, 1997). The presence or absence of this species in the brine pool transition area is not known since no night-time surveys have been conducted specifically in this area. However, it is not likely to occur in the brine pool transition area since unvegetated playa is not a preferred habitat type for this species and moths, the primary prey, are not expected to be present in the brine pool transition area.

Other Sensitive Species

In addition to the listed species and the CDFG Species of Special Concern, the following species that are known to or have the potential to occur in the unvegetated playa may be considered sensitive or locally important species:

- **Yuma Myotis** (*Myotis yumanensis*) and **Small-footed Myotis** (*Myotis ciliolabrum*) – These two bat species are designated as Sensitive Species by the Bureau of Land Management (BLM); it is BLM policy to provide sensitive species with the same level of protection that is given federal candidate species (CDFG, 2005). These species are also designated as “low-medium priority” (Yuma myotis) and “medium priority” (small-footed myotis) by the Western Bat Working Group (WBWG), which is comprised of agencies, organizations and individuals interested in bat research, management, and conservation in the western U.S. and Canada (CDFG, 2005). “Medium priority” indicates a level of concern that should warrant closer evaluation, more research, and conservation actions of both the species and possible threats, where as “low priority” is an indication that most of the existing data support stable populations of the species (WBWG, 2005).

  Yuma myotis occurs in a variety of habitats including riparian, arid scrublands and deserts, and forests; small-footed myotis occurs in deserts, chaparral, riparian zones and western coniferous forests (WBWG, 2005). They feed on various small insects and roost in bridges, buildings, cliff crevices, caves, mines, and trees (WBWG, 2005). Both species were observed on unvegetated playa habitats in 1995-1996 surveys (GBUAPCD, 1997). Presence of these species in the brine pool transition area is not known, but they may forage in the area for aerial insects. In the winter when temperatures are lower and food is less abundant, these species are likely to be inactive or migrate out of the Owens Valley.

- **Alkali Flats Tiger Beetle** (*Cicindela willistoni pseudosenilis*)**, Slender-girdled Tiger Beetle** (*Cicindela tenuicincta*)**,** and **Owens Valley Tiger Beetle** (*Cicindela tranquebarica inyo*) – These three species of tiger beetles have no official sensitive status but are endemic to the Owens Valley and therefore are considered locally important species, but are common on the Owens Lake (GBUAPCD, 1997; GBUAPCD, 2003). These species are found on damp unvegetated playa, and feed on other insects (such as alkali flies); the Owens Valley tiger beetle also occurs on moist and saturated alkaline meadows (GBUAPCD, 1997). Tiger beetles do not stray far from damp areas, and are also restricted in their habitat range by the availability of food (alkali flies) (GBUAPCD, 1997). They were observed in seeps and springs at Owens Lake during the 1995-1996 surveys (GBUAPCD, 1997). The Owens Valley and alkali-flats tiger beetles were found in saltgrass-dominated Transmontane Alkali Meadow in 2003; habitat for slender-girdled tiger beetle was found in saltgrass-dominated Transmontane Alkali Meadow in 2003 (GBUAPCD, 2003). Presence of these species in the brine pool transition area has not been documented.

3.2.3.3 Agency Plans and Policies Relevant to Biological Resources Management in the Project Area

There are no adopted Habitat Conservation Plans, Natural Community Conservation Plans, or other approved local, regional or state habitat conservation plans that are applicable to the Project area. However, there are several documents prepared by federal and local agencies that contain plans and policies related to biological resources management in the Owens Lake area as summarized below.

U.S. Fish and Wildlife Service Owens Basin Wetland and Aquatic Species Recovery Plan

The U.S. Fish and Wildlife Service (USFWS) prepared the Owens Basin Wetland and Aquatic Species Recovery Plan (USFWS, 1998) to describe actions necessary to restore the populations and enhance habitat for three federally listed species that occur in the Owens Valley – Owens pupfish, Owens tui chub, and Fish Slough milk-vetch. The recovery plan also identifies conservation actions and programs to serve as a foundation for future Habitat Conservation Plans for these species, as well as several others that could be listed in the future – Owens Valley vole, Owens Valley speckled dace, Long Valley speckled dace, Owens Valley springsnail, Fish Slough springsnail, Owens Valley checkerbloom, and Inyo County mariposa lily. The plan describes various Conservation Areas to be established in the valley to achieve recovery of these species. This recovery plan is a guidance document; implementation of actions outlined in this plan is not legally required. None of these species are known or expected to occur in the brine pool transition area.

Bureau of Land Management Bishop Resource Management Plan

BLM prepared the Bishop Resource Management Plan for the Bishop Resource Area (BLM, 1991). The Bishop Resource Area encompasses 750,000 acres of public land and approximately 9,000 acres of federal mineral estate underlying privately owned land in the Eastern Sierra Nevada (Mono County and Inyo County). The Management Plan is intended to provide a comprehensive framework for managing BLM-administered public lands in the Bishop Resource Area. The Management Plan divides the Resource Area into nine Management Areas. The Owens Lake Management Area covers Owens Lake from approximately Olancha on the south, to Lone Pine on the north. BLM administers approximately 15,790 acres in this Management Area. In addition to protecting scenic resources, the overall management goal for the Owens Lake Management Area is to protect wildlife and enhance habitat in the area. The brine pool transition area is located on State-lands and is not BLM-administered land.

Inyo County General Plan

The Inyo County General Plan (Inyo County, 2001) has established policies that are related to biological resources issues in the County. As discussed in Section 13 of the LORP Final EIR (LADWP, 2004a), the proposed project is consistent with the applicable Inyo County General Plan policies related to biological resources.

Inyo County / Los Angeles Long Term Water Agreement

The 1991 Inyo County / Los Angeles Long Term Water Agreement is a joint groundwater management agreement between LADWP and Inyo County. The overall goal of the agreement is to manage the water resources within Inyo County in a manner that "avoid[s] certain described decreases and changes in vegetation and to cause no significant effect on the environment which cannot be acceptably mitigated while providing a reliable supply of water for export to Los Angeles and for use in Inyo County." Implementation of the proposed project is consistent with Section XII ("Lower Owens River" section) of the agreement, as amended by other documents including the 1991 EIR, the MOU and court stipulations.

3.2.3.4 Other Plans and Designations Relevant to the Project Area

The following describes plans and designations that identify the Owens Lake area as important bird habitat.

U.S. Shorebird Conservation Plan

The U.S. Shorebird Conservation Plan is a collaborative document prepared by a partnership of agencies and organizations throughout the United States committed to the conservation of shorebirds. The Plan outlines conservation goals for each region of the country, identifies critical habitat conservation needs and key research needs, and proposes education and outreach programs to increase awareness. Owens Lake is identified as a key shorebird area of the Intermountain West Region, especially in providing breeding habitat for snowy plovers and habitat for transient sandpipers (USSCPC, 2000).

Audubon Important Bird Area

Owens Lake has been designated an Important Bird Area by Audubon California (2005), a non-profit, non-governmental organization whose mission is to conserve and restore natural ecosystems, focusing on birds, other wildlife and their habitats. The Important Bird Areas Program works through partnerships to identify places that are important habitats for birds and to focus conservation efforts on protecting these sites. Approximately 150 sites in California have been designated as Important Bird Areas by Audubon California (2005). The Important Bird Area designation reflects the efforts of a non-profit organization and is not a regulatory program.

3.3 SIGNIFICANCE THRESHOLDS

Based on State CEQA Guidelines, Appendix G, the proposed project would have significant impacts on biological resources if it would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive or special status species in local or regional plans, policies or regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional or state habitat conservation plan

CEQA Section 21001 (c) states that it is the policy of the state of California to “prevent the elimination of fish and wildlife species due to man’s activities, ensure that fish and wildlife populations do not drop below self-perpetuating levels, and preserve for future generations representations of all plant and animal communities.”

Based on the State CEQA Guidelines, Appendix G, the proposed project would have a significant impact with respect to hydrology and water quality if it would:

- Violate any water quality standards or waste discharge requirements;
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted);
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation onsite or offsite;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding onsite or offsite;

- Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- Otherwise substantially degrade water quality;
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;
- Place within a 100-year flood hazard area structures which would impede or redirect flood flows;
- Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam; or
- Expose people or structures to a significant risk of loss, injury or death involving inundation by seiche, tsunami, or mudflow.

3.4 IMPACTS

3.4.1 Hydrologic Changes Resulting from the Project

3.4.1.1 Summary of Proposed Flow Releases toward the Delta

Under the proposed project, flows will be released toward the Delta from the proposed pump station (to be located approximately 4.5 river miles downstream of Keeler gage) as described in Section 2.4.2 of the Final EIR (LADWP, 2004a) and summarized below:

- **Minimum Flow.** At any time, flows released from the pump station will be a minimum of approximately 3 cfs.
- **Baseflows and Pulse Flows.** Flows released from the proposed pump station will be an annual average of approximately 6 to 9 cfs (equivalent to 4,344 and 6,516 acre-feet per year, respectively), excluding the amount released from the pump station during seasonal habitat flows (described below). Within this 6 to 9 cfs annual average, the following two types of flows will be released:
  - ❑ **Baseflows** – Baseflows released from the pump station will be adjusted during the first year to maintain an average daily outflow of approximately 0.5 cfs from the vegetated portion of the Delta (while still maintaining the 3 cfs minimum flow at any time). (The intent of this approach is to calibrate the discharge to the Delta to match evapotranspiration demand in the Delta.)
  - ❑ **Pulse Flows** – Pulse flows will be released as follows beginning in the second year, and will consist of the following:
    - Period 1 – 25 cfs released for 10 days in March/April (496 acre-feet)
    - Period 2 – 20 cfs released for 10 days in June/July (397 acre-feet)
    - Period 3 – 25 cfs released for 10 days in September (496 acre-feet)
    - Period 4 – 30 cfs released for 5 days in November/December (298 acre-feet)

Within the range of 6 to 9 cfs annual average, the magnitude, duration and timing of both baseflows and pulse flows will be adjusted based on monitoring triggers (acreage of vegetated wetlands and water and habitat suitability index) described in Section 2.4.2.2 of the Final EIR (LADWP, 2004a).

- **Bypass of Seasonal Habitat Flows.** In years when the forecasted runoff for the Owens Valley is above 50 percent of "normal" (defined as the 50-year mean), seasonal habitat flows will be released from the River Intake to the River in late May or early June. Seasonal habitat flows will be ramped up from 40 cfs to a peak flow and ramped back down to 40 cfs over several days. The magnitude of the seasonal habitat flow released each year will vary from zero (years with a forecasted runoff of 50 percent or less of "normal") to 200 cfs at peak flow (years with a forecasted runoff of 100 percent or more of "normal") in proportion to the forecasted runoff.

  The seasonal habitat flow would be reduced by channel losses between the River Intake and the pump station. Seasonal habitat flows reaching the pump station will be diverted up to the capacity of the pump station (50 cfs), and the remaining amount ("seasonal habitat flow bypass"), if any, will be released toward the Delta.

- **Bypass of Winter Habitat Flow and Alabama Release (first year only).** During only the first year of project implementation, a "winter habitat flow" of up to 200 cfs (ramped up and down over 14 days) will be released at the River Intake in lieu of the seasonal habitat flow described above. In conjunction with this winter habitat flow, additional releases will be made to the River from the Aqueduct at the Alabama spillgate ("Alabama Release") to achieve a combined minimum flow of 200 cfs in the River below Alabama Spillgate for a minimum period of 96 hours. [The Alabama Release was specified as a permit condition by the Regional Board (Order No. R6V-2005-0020 NPDES No. CA0103225, WDID No. 6B140407009, Water Quality Certification, Waste Discharge Requirements, and National Pollutant Discharge Elimination System Permit, adopted July 13, 2005)]. A portion of the winter habitat flow and Alabama Release will be lost to channel losses prior to reaching the pump station; the portion of the winter habitat flow and Alabama Release reaching the pump station will be diverted up to the capacity of the pump station (50 cfs), and the remaining amount will be released toward the Delta.

As summarized above, the specific magnitude of baseflows released from the pump station toward the Delta under LORP will be determined during the first year, with possible adjustments in subsequent years. For the purpose of analysis presented in this SEIR, however, conceptual release scenarios were developed based on the following assumptions:

- Pulse flows will be released four times a year as described above. The Period 1 pulse flow will be released in late March.
- From October through March (non-growing season), baseflows will be 3 cfs (i.e., the proposed minimum flow).
- The quantity remaining after deducting the pulse flows (1,687 acre-feet) and minimum winter baseflows (1,000 acre-feet) from the 6 to 9 cfs annual average (4,344 to 6,516 acre-feet) is the amount available for baseflows from April to September (growing season) (1,657 to 3,829 acre-feet, or an average flow of approximately 5 to 12 cfs).

- During seasonal habitat flows, the total channel loss between the River Intake and the pump station (62 river miles) is assumed to be 62 cfs (based on an estimated channel loss rate of 1 cfs per mile[11]; LADWP, 2004a). Based on this channel loss assumption:
    - ☐ Little or no seasonal habitat flow bypass (above the baseflow) would occur in years when the seasonal habitat flow at the River Intake is less than 115 cfs at peak flow (i.e., forecasted runoff is approximately 73 percent or less; estimated to occur approximately 30 percent of the time).
    - ☐ In years with a forecasted runoff of 100 percent or more (i.e., 200 cfs peak flow at River Intake), seasonal habitat flow bypass (above the minimum 3 cfs baseflow) would range from approximately 12 to 88 cfs over 5 days. This represents the maximum bypass, and is expected to occur approximately 45 percent of the time.

Based on the above assumptions, the following four conceptual scenarios were developed to describe a range of flow conditions (flows released from the pump station toward the Delta) possible under the proposed project:

- **Scenario 1 –** Total of baseflows and pulse flows is 6 cfs annual average, and it is a year when the forecasted runoff is 73 percent or less (i.e., no seasonal habitat flow bypass). This represents the minimum release regime in drier years.
- **Scenario 2 –** Total of baseflows and pulse flows is 9 cfs annual average, and it is a year when the forecasted runoff is 73 percent or less (i.e., no seasonal habitat flow bypass). This represents the maximum release regime in drier years.
- **Scenario 3 –** Total of baseflows and pulse flows is 6 cfs annual average, and it is a year when the forecasted runoff is 100 percent or more (i.e., seasonal habitat flow is 200 cfs at peak flow). This represents the minimum release regime in normal or wet years.
- **Scenario 4 –** Total of baseflows and pulse flows is 9 cfs annual average, and it is a year when the forecasted runoff is 100 percent or more (i.e., seasonal habitat flow is 200 cfs at peak flow). This represents the maximum release regime in normal or wet years.

Table 3-10 and **Figure 3-15** compare estimated existing discharges at the proposed pump station site with the above four release scenarios under LORP. The conceptual scenarios presented in Table 3-10 and Figure 3-15 are not applicable to the first year of project implementation. During the first year, no pulse flows will be released, and a winter habitat flow will be released in lieu of the seasonal habitat flow (see **Figure 3-16**).

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[11] After establishment of the 40-cfs baseflow in the River under LORP, the channel loss rate during seasonal habitat flows may be reduced over time as the system reaches equilibrium. Under a lower channel loss rate estimate of 0.35 cfs per mile, seasonal habitat flow bypass would range from 7 to 128 cfs over 9 days.

Table 3-10
Summary of Estimated Existing Flows at the Pump Station Site and Proposed Releases from the Pump Station under LORP (Conceptual Scenarios)

Period	**Existing Average at Keeler Gage**(3)	**Estimated Existing Average at Pump Station Site**(4)	**Proposed Releases From Pump Station**			
			Years with Below 73% of Normal Runoff (No Seasonal Habitat Flow Bypass)		**Years with 100% or more of Normal Runoff** (Seasonal Habitat Flow(5) = peak flow 200 cfs at River Intake)	
			Scenario 1 (6 cfs annual avg.)	**Scenario 2** (9 cfs annual avg.)	**Scenario 3** (6 cfs annual avg.)	**Scenario 4** (9 cfs annual avg.)
October – March(1) (183 days)						
Discharge (acre-feet)	4,872	4,295	1,794	1,794	1,794	1,794
Average Flow (cfs)	13.4	11.8	4.9	4.9	4.9	4.9
Change	---	---	*-58%*	*-58%*	*-58%*	*-58%*
April – September(2) (182 days)						
Discharge (acre-feet)	3,172	2,593	2,550	4,722	2,909	5,014
Average Flow (cfs)	8.8	7.2	7.1	13.1	8.1	13.9
Change	---	---	*-2%*	*+82%*	*+12%*	*+93%*
Annual Total						
Discharge (acre-feet)	8,044	6,888	4,344	6,516	4,703	6,808
Average Flow (cfs)	11.1	9.5	6.0	9.0	6.5	9.4
Change	---	---	*-37%*	*-5%*	*-32%*	*-1%*

cfs = cubic feet per second

(1) Includes 3 cfs baseflows and Period 1 and Period 4 pulse flows.

(2) Includes baseflows of 5.2 to 12.0 cfs, Period 2 and Period 3 pulse flows, and seasonal habitat flows.

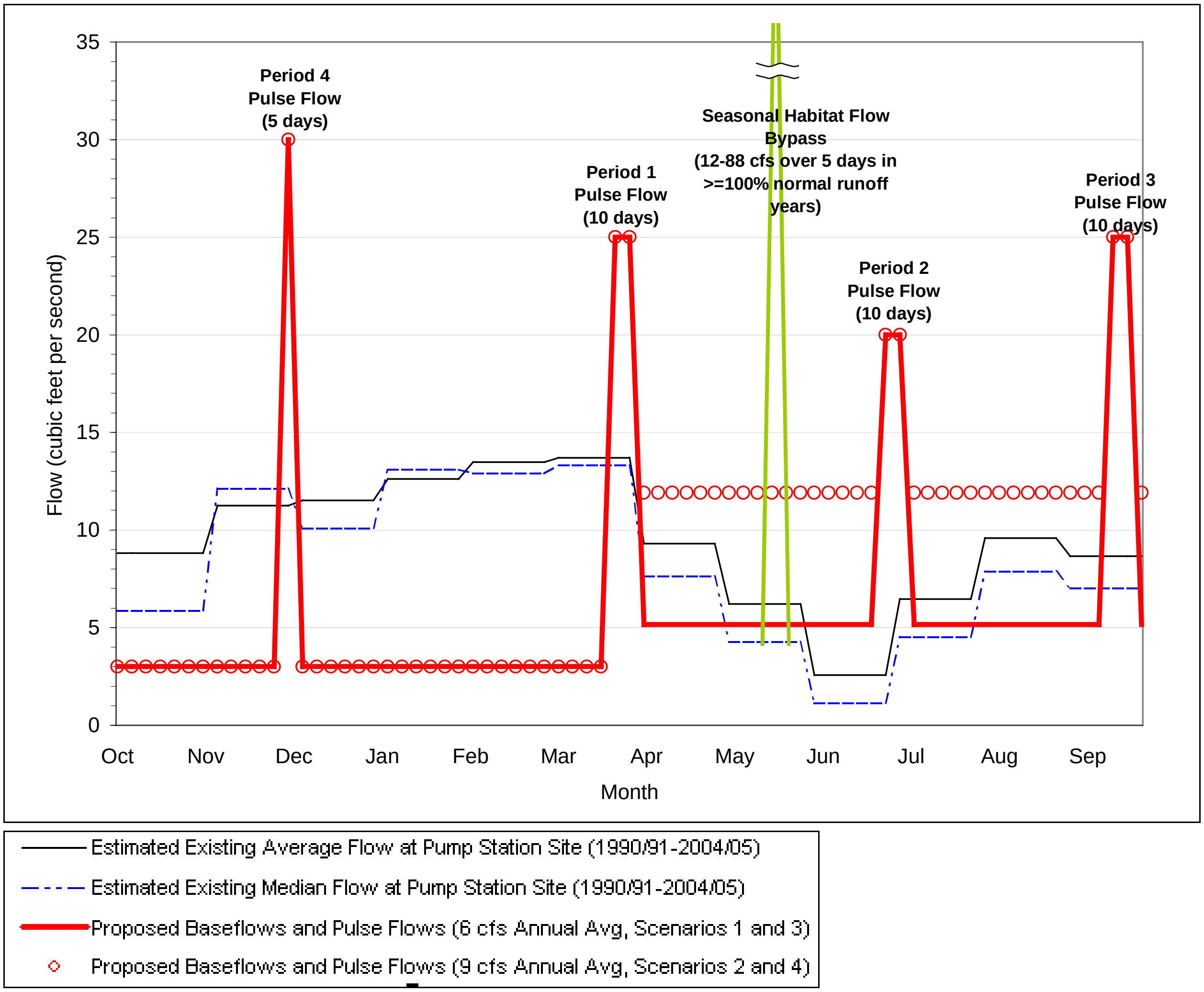
(3) 15-year average for the 1990/1991 to 2004/2005 water years. Source: LADWP, 2005a.

(4) Existing average at Keeler gage minus 1.6 cfs (channel loss over the 4.5 river miles between Keeler gage and pump station site at a rate of 0.35 cfs per mile). This estimated channel loss rate is for steady state conditions, as described in the Final EIR (LADWP, 2004a).

(5) Assumes a channel loss rate of 1 cfs per mile (a total of 62 cfs channel loss over 62 river miles from River Intake to Pump Station) and pump station diversion of up to 50 cfs. This estimated channel loss rate during seasonal habitat flows are described further in the Final EIR (LADWP, 2004a).

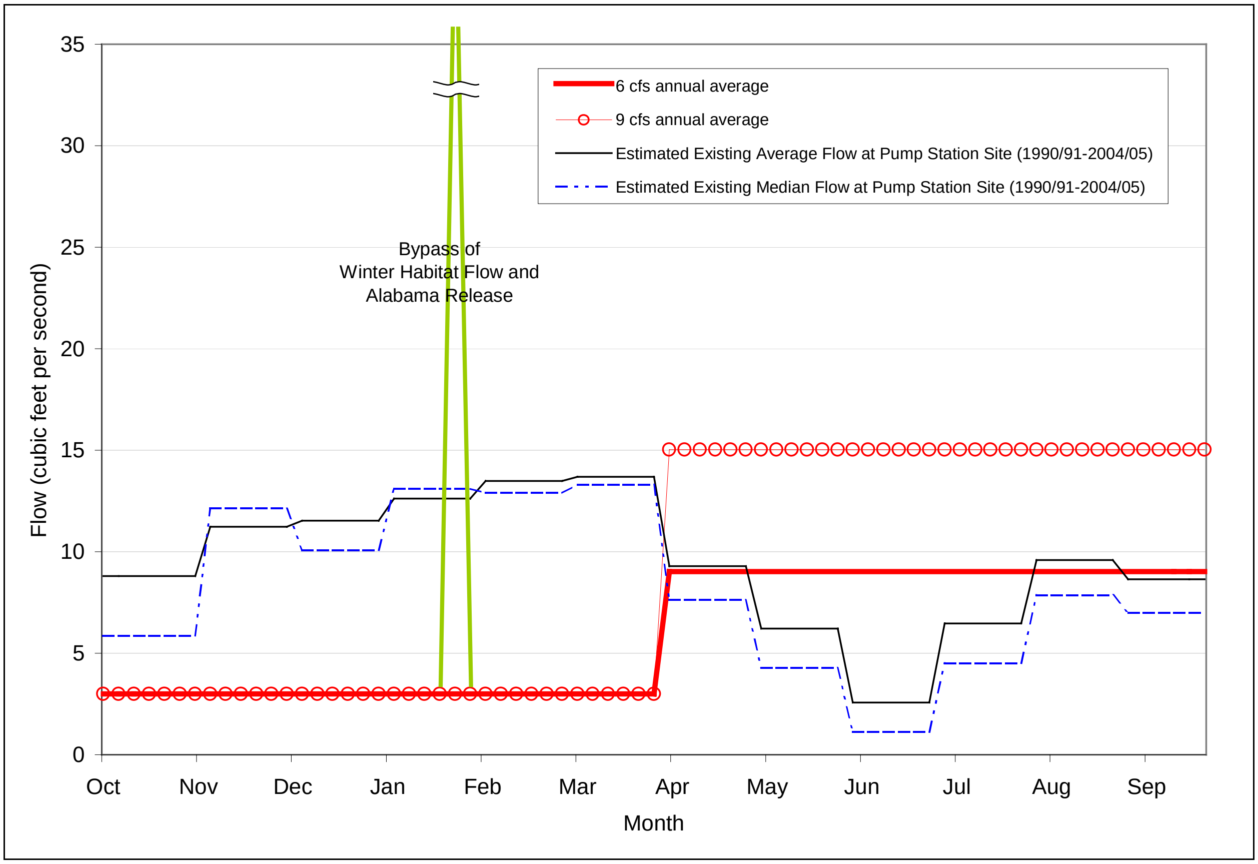
Note: This table presents simplified, conceptual scenarios of proposed releases for illustration purposes only. In reality, the specific baseflows (especially during the growing season) would be determined during the first year based on outflow monitoring as described above. Average flows from April through September are expected to be higher than 7.1 cfs (Scenario 1) or 8.1 cfs (Scenario 3) since the amount of inflow needed to result in 0.5 cfs outflow from the Delta would be greater based on observation of existing conditions.

Figure 3-15
Conceptual Hydrographs – Estimated Existing Flows at the Pump Station Site and Proposed Releases from the Pump Station under LORP (Sample Scenarios)



Note: This graph presents simplified, conceptual hydrographs of the proposed releases for illustration purposes only. In reality, the specific baseflows (especially during the growing season) would be determined during the first year based on outflow monitoring as described above. Baseflows during the growing season are expected to be higher than 5 cfs (shown in the graph above as a solid red line, under Scenarios 1 and 3), since the amount of inflow needed to result in 0.5 cfs outflow from the Delta would be greater than 5 cfs based on observation of existing conditions.

Figure 3-16
Conceptual Hydrographs – Estimated Existing Flows at the Pump Station Site and Proposed Releases from the Pump Station under LORP (First Year)



Note: This graph presents simplified, conceptual hydrographs of the proposed releases for illustration purposes only. In reality, the specific baseflows (especially during the growing season) would be determined during the first year based on outflow monitoring as described above.

3.4.1.2 Anticipated Changes in Delta Outflow to the Brine Pool Transition Area

As described above, the focus of the analysis for this SEIR is the potential impacts to the brine pool transition area that would result from the changes in outflows from the Delta under the proposed project. There are currently no gages that measure outflows from the Delta. Measurements at Keeler gage can be used to estimate inflows to the Delta; however, since specific channel loss rates (percolation and evapotranspiration) are not known, outflows to the brine pool transition area and the resulting hydrologic conditions under existing conditions have been described qualitatively based on review of remote imagery and other photographs (see **Section 3.2.2.2**).

The following presents the analysis of anticipated changes in Delta outflows to the brine pool transition area based on the description of existing conditions presented in **Section 3.2.2.2** and the conceptual scenarios for proposed releases from the pump station described above.

For the discussion presented below, a water year is divided two portions: April through September (typical growing season or "summer", characterized by higher temperatures, lower precipitation and higher evapotranspiration) and October through March ("winter," characterized by lower temperatures, higher precipitation and lower evapotranspiration). It is recognized, however, that environmental conditions are variable from year to year.

April through September

As described in **Section 3.2.2.2**, after 2000, in the period from April/May through September/October, there have been typically no outflows from the Delta into the brine pool. This is due to the combination of generally low inflows to the Delta under existing conditions and high water consumption (evapotranspiration) in the Delta. Even relatively high River flows (greater than 9 cfs) measured at Keeler gage have resulted in no outflow from the Delta.

As described in **Table 3-10**, from April through September, the overall discharge to the Delta under LORP is estimated to range from similar to existing conditions (Scenario 1 -- 6 cfs annual average with no seasonal habitat flow bypass) to an increase of 93 percent (Scenario 4 -- 9 cfs annual average with high seasonal habitat flow bypass). The overall average flow to the Delta during the growing season is expected to range from 7 to 14 cfs (compared to existing average flow of approximately 7 cfs). More specifically, this will consist of the following (see **Figure 3-15**):

- **Baseflow of 5- to 12-cfs** (average flow over approximately 160 days) – Due to high evapotranspiration in the Delta, baseflow released to the Delta during the growing season is not likely to result in outflow from the Delta to the brine pool transition area.
- **20 cfs for 10 days in June/July (Period 2 pulse flow) –** Under LORP, the flows released in June would be higher than existing conditions, and are expected to saturate soils and meet evapotranspiration needs of existing vegetation in the Delta. Therefore, it is anticipated that channel losses in the Delta during the release of higher flows in late June/early July (Period 2 pulse flow) would primarily be from percolation and evapotranspiration in areas not wetted under baseflow conditions and evaporation from free water surface. Therefore, it is anticipated that a portion of the pulse flow would outflow from the Delta for up to approximately 10 days, creating rivulets in the brine pool transition area.
- **25 cfs for 10 days in September (Period 3 pulse flow) –** Similar to the Period 2 pulse flow, it is anticipated that a portion of the Period 3 pulse flow would result in outflow from the Delta for up to approximately 10 days, creating rivulets in the brine pool transition area.
- **Seasonal habitat flow bypass (up to 12 to 88 cfs over 5 days in May/June in some years depending on the forecasted runoff for the Owens Valley) –** It is anticipated that a portion of the seasonal habitat flow bypass to the Delta would result in outflows to the brine pool transition area for a few days. Over the life of the project, this is expected to occur approximately 50 percent of the years.

In summary, from April through September, operation of the pump station under LORP is not expected to result in substantial change to existing hydrologic conditions of the brine pool transition area (i.e., typically no outflow from the Delta) except during periods of higher flow releases (pulse flows and seasonal habitat flow bypass). The Period 2 and 3 pulse flows and the seasonal habitat flow bypass are anticipated to result in surface water in the brine pool transition area during periods when the area is typically dry under existing conditions.

October through March

As described in **Section 3.2.2.2**, under existing conditions, outflows from the Delta to the brine pool transition area generally occur from October/November through March/April. Due to lower evapotranspiration rates during this period, even lower River flows (as low as 5 cfs) measured at Keeler gage result in outflow from the Delta. However, the absolute minimum flow at Keeler gage which would result in outflow to the brine pool transition area cannot be determined from review of these data due to the high variability of seasonal and annual temperatures and hydrologic conditions.

As described in **Table 3-10**, from October through March, the overall discharge to the Delta under LORP is estimated to be reduced by approximately 58 percent under all of the sample scenarios compared to existing conditions, since the proposed flows are designed to provide higher flows during the growing season. The overall average flow during the non-growing season would be 5 cfs. More specifically, this will consist of the following (see **Figure 3-15**):

- Baseflow of 3-cfs (approximately 170 days) – Flows to the Delta under LORP from October through March would be lower than under existing conditions. However, the proposed minimum baseflow of 3 cfs is expected to result in some outflow to the brine pool transition area due to low evapotranspiration in the Delta during the non-growing season. Therefore, under LORP, the areal extent and depth of surface water of the rivulets in the brine pool transition area would be smaller compared to existing conditions, but would not be eliminated.
- 30 cfs for 5 days in November/December (Period 4 pulse flow) – Period 4 pulse flow would result in flows to the Delta that are more than twice as high compared to existing average conditions for November/December. For up to approximately 5 days, the Period 4 pulse flow would result in larger extent and depth of surface water in the brine pool transition area than under typical existing conditions.
- 25 cfs for 10 days in March (Period 1 pulse flow) – Period 1 pulse flow would result in flows to the Delta that are approximately twice as high as existing average conditions for March. For up to approximately 10 days, the Period 1 pulse flow would result in larger extent and depth of surface water in the brine pool transition area than under typical existing conditions.

In summary, from October through March, operation of the pump station under LORP is expected to result in a reduction in the outflows from the Delta and thus a reduction (but not an elimination) in the areal extent and depth of surface water in the brine pool transition area, except during periods of higher flow releases (pulse flows). The Period 1 and 4 pulse flows are anticipated to result in larger extent and depth of surface water in the brine pool transition area than under typical existing conditions for up to approximately 15 days.

3.4.2 Impacts on Biological Resources

3.4.2.1 Impacts on Riparian Habitat or Other Sensitive Community

Alkali playa is considered by CDFG to be a community that is known or believed to be of high priority for inventory in the California Natural Diversity Database (CDFG, 2003d). The community type of the brine pool transition area can generally be characterized as alkali playa. Implementation of LORP would not require any construction or other development in the brine pool transition area.

However, as described above, operation of the pump station would reduce the amount of surface water in the brine pool transition area in the winter compared to existing conditions. In the summer, operation of the pump station would not substantially change the hydrologic conditions in the brine pool transition area except during releases of pulse flows and seasonal habitat flow bypass, which are expected to increase surface water in the brine pool transition area for short periods of time.

Alkali flies are expected to be the dominant consumer species in the brine pool transition area. Under existing conditions, the brine pool transition area is essentially dry from April/May through September/October, the period when temperature conditions are most suitable for alkali fly reproduction. Additionally, vegetation and other suitable substrate for alkali fly larvae/pupae attachment are generally absent in the brine pool transition area. Therefore, it is likely that the adult flies found in the brine pool transition area are displaced individuals that can take shelter and feed in cracks in the salt playa. Operation of the pump station would reduce (but not eliminate) the extent and water depth of rivulets in the brine pool transition area. The reduction of surface water in the brine pool transition area during the colder months may have some effect on alkali fly populations, particularly in the transition months in spring and fall when temperatures are higher and more suitable for reproduction. However, since this is not optimal habitat for alkali flies, the change in flows during the colder months is not expected to substantially affect alkali fly populations (food source for birds that feed on insects).

As described above in **Section 3.2.3.1**, the alkali playa habitat of the brine pool transition area provides habitat for the following type of birds (and bats) (see also **Appendix B**). Project-related impacts on the use of this habitat are described below. Since the project related changes to hydrologic conditions in the brine pool transition area would be limited to approximately October through March, the following description is focused on that period.

- Resident, migratory, or wintering shorebirds that feed on invertebrates present on the wet playa and/or use the area for roosting (e.g., black-bellied plover, snowy plover, semipalmated plover, killdeer, black-necked stilt, American avocet, greater yellowlegs, lesser yellowlegs, willet, spotted sandpiper, whimbrel, long-billed curlew, marbled godwit, western sandpiper, least sandpiper, dunlin, ring-billed gull, and California gull)
    - ☐ Prior to the implementation of the dust control project in 2002, hundreds to thousands of individuals have been observed in the brine pool transition area (based primarily on data submitted by M. Prather, see also **Section 3.2.3.1** and **Appendix B**). Since 2002, observed use of the brine pool transition area has decreased, ranging from less than 10 up to low hundreds. After implementation of LORP, reduced winter flows to

  the brine pool transition area from operation of the pump station are expected to reduce but not completely eliminate use of this area for these species. It is anticipated that these individuals would also make use of other nearby habitats on the lake bed, including the shallow flood areas and seeps and springs.

- Shorebirds that nest in or near wet unvegetated playa (e.g., snowy plover, American avocet, and black-necked stilts)
  - ❑ As noted above, American avocets and black-necked stilts are not known to and are not expected to nest in the brine pool transition area. Therefore, operation of the pump station under LORP would not affect the availability of nesting habitat for these species. (In the summer, the anticipated increases in outflows to the brine pool transition area during Period 1 and 4 pulse flows and seasonal habitat flow bypass under LORP may improve nesting habitat for these species.) Additional discussion regarding western snowy plovers is provided in **Section 3.4.2.2**.
- Birds of prey that fly over the playa in transition to other habitats or to look for prey birds (e.g., prairie falcon and northern harrier)
  - ❑ Harriers prefer marshes and other habitats that are vegetated; therefore, the brine pool transition area is not considered suitable habitat for harriers. Falcons may feed on the limited number of birds currently present in the brine pool transition area. However, falcons prefer to hunt in areas with higher densities of prey birds (e.g., shallow flood areas of the Dust Mitigation Program) than typically present in the brine pool transition area under existing conditions. Therefore, the possible reduction in the number of birds in the brine pool transition area in winter under LORP would not substantially affect the food supply for the birds of prey.
- Passerines, other birds and bats that fly over the playa to feed on flying insects (e.g., several species of swallows and white-throated swift) or forage on the ground for insects (horned lark and Savannah sparrow)
  - ❑ Under existing conditions, these types of birds are observed in small numbers (generally fewer than 10) on any given survey date, and have been observed foraging on the dry playa. They are observed when outflows to the brine pool transition area are present and when flows are absent. Bats have not been observed but may forage above the brine pool transition area. As described above, reduction of surface water in the brine pool transition area in the winter would not result in substantial reduction of invertebrate food sources for these species.
- Waterfowl that use the area (when sufficient amounts of water are present) for roosting, swimming or drinking (e.g., Canada goose, snow goose, green-winged teal, cinnamon teal, and mallard)
  - ❑ Prior to the implementation of the dust control project in 2002, hundreds up to a thousand waterfowl individuals have been observed in the brine pool transition area (based primarily on data submitted by M. Prather, see also **Section 3.2.3.1** and **Appendix B**). Since early 2002, few waterfowl have been observed in the brine pool transition area. Under existing conditions, the primary use of the brine pool transition area by waterfowl, if any, is expected to be for temporary roosting and escaping from predation, hunting or other disturbance. Since LORP does not involve any

construction or other development in the brine pool transition area, this area would remain available for roosting and escaping after implementation of LORP. Therefore, reduction of surface water in the brine pool transition area in the winter would not substantially affect waterfowl species.

Currently, the shallow flood areas for the Dust Mitigation Program are the predominant areas of the Owens Lake used by waterbirds. Bird populations observed at the brine pool transition area (and the seeps and springs) are a small fraction of the total Owens Lake populations. The alkali playa habitat of the brine pool transition area is similar to and is a small fraction of the habitat provided by the shallow flood areas, which are immediately adjacent to the brine pool transition area. In addition to the shallow flood areas, this habitat type is also present at the outflows of seeps and springs, which would not be affected by LORP. There are no bird species that are found only in the brine pool transition area. In addition, no birds are currently expected to nest in this area. Furthermore, the reduction in outflows to the brine pool transition area would occur during the time of the year when water is abundant at other places around the lake (shallow flooding areas and the seeps and springs). Additionally, after October/November, when outflows to the brine pool transition area would be reduced under the proposed project, fewer shorebirds are present in the Owens Valley in general since it is past the peak migration period. For these reasons, the brine pool transition area is considered marginal habitat for birds. Therefore, within the context of existing conditions of the Owens Lake, the impact of reduced winter outflow to the brine pool transition area on the value of this alkali playa habitat would be less than significant. No mitigation is required.

In addition, under the proposed project, hundreds of acres of shallow flooded areas in the Blackrock Waterfowl Habitat Area, rewatering of the River, and increased summer flows to the vegetated portions of the Delta would create and enhance shorebird and waterfowl habitat. Overall, habitat for waterfowl, wading birds, and shorebirds (including species currently present in the brine pool transition area) will be increased after implementation of LORP. Specifically:

- Existing conditions in the River (low flow conditions and lack of seasonally flooded habitats along the channel) are not optimal as habitat for waterfowl and shorebirds. Establishment of the 40-cfs baseflow and release of seasonal habitat flows would create riparian forest (potential nesting areas for herons, egrets, wood ducks), seasonally flooded habitats adjacent to or in the floodplain (foraging areas for a variety of waterbirds including ducks, wading birds and shorebirds), and seasonally exposed areas in the river channel (side bars or mud shore left exposed after seasonal habitat flows, which would serve as foraging areas for wading birds and possibly shorebirds such as spotted sandpipers and killdeers).
- Existing conditions in the Blackrock area (static hydrologic conditions and expansive marsh with low habitat diversity and edge-ratio) are not optimal as habitat for waterfowl and shorebirds. The proposed water management for the Blackrock area involves wetting and drying cycles that will provide the periodic disturbance essential for enhancing shorebirds and waterfowl habitat (e.g., shallow inundated areas which would improve feeding opportunities, and increased vegetation diversity which would improve nesting habitat). However, these enhancements would not be expected to provide significant habitat in the Blackrock area for snowy plovers and black-bellied plovers, which prefer

habitats of the Delta. (The proposed water management is in part based on waterfowl census conducted by CDFG and LADWP in the 1980s; bird populations were observed to be positively correlated with flooding in the Blackrock area.)

- Increased flows to the vegetated portions of the Delta in the summer are expected to be highly beneficial to shorebirds. Under existing conditions, except for some permanent ponds created due to beaver activity in the northern portion, much of the Delta is dry in the summer. Under LORP, the presence of water in the vegetated portions in the summer (during a time of year when water supplies are more limited in the area) would attract shorebirds to nest. Under existing conditions, the numbers of shorebirds and waterfowl observed in the vegetated areas of the Delta are generally greater than the numbers observed in the brine pool transition area on a given survey date (unpublished information collected for the Lower Owens River Project Baseline Bird Monitoring Survey and compiled by D. House, LADWP Watershed Resource Specialist). Other similar vegetated areas in the Blackrock area that are flooded during the summer currently attract nesting American avocets, black-necked stilts, and long-billed curlews. Southbound shorebird migration begins in mid- to late June with the majority of shorebirds migrating south in the period from August through early fall. Implementation of LORP would increase flows to the vegetated portions of the Delta in the summer, and therefore would be expected to attract southbound migrant shorebirds and also establish resident breeding populations. Other parts of the valley that are flooded during mid-summer are currently used by *Calidris* sandpipers, phalaropes, and ibis.

3.4.2.2 Impacts on Sensitive Species

Except for the peregrine falcon (see discussion below), there are no plant or wildlife species listed as Endangered or Threatened under the federal or State Endangered Species Act that are known or have the potential to occur in the brine pool transition area. In addition, there are no special status plant, fish, amphibian, reptile or mammalian species that are known or have the potential to occur in the brine pool transition area.

As described above in **Section 3.2.3.2**, several birds designated by the CDFG as California Species of Special Concern are known or have the potential to occur in the unvegetated playa habitat of the Owens Lake. As described above, although white-faced ibis, osprey, burrowing owl, and mountain plovers are known to occur in other unvegetated playa areas of the lake bed, they are not known and are not expected to occur in the brine pool transition area.

Long-billed curlew has not been observed in the brine pool transition area since spring of 2000 and currently is not expected to occur. The northern harrier and prairie falcon have been observed flying over the brine pool transition area, and may forage in this area for small birds; Peregrine falcon has not been observed since 2000. The ferruginous hawk has not been observed, and is not expected to forage in this area. Harriers prefer marshes and other habitats that are vegetated; therefore, the brine pool transition area is not considered suitable habitat for northern harriers. Falcons may feed on the limited number of birds currently present in the brine pool transition area. However, falcons prefer to hunt in areas with higher densities of prey birds (e.g., shallow flood areas of the Dust Mitigation Program) than typically present in the brine pool transition area under existing conditions. Therefore, the possible reduction in the number of birds in the brine pool transition area in winter under LORP would not substantially affect the food supply for peregrine falcons and prairie falcons. The brine pool transition area is not a suitable nesting habitat for any of these birds of prey.

California gulls have been observed in the brine pool transition area only since May 2002; use of the brine pool transition area by this species is likely incidental to their primary use of the nearby shallow flood areas. Furthermore, California gulls are not known and are not expected to nest in the brine pool transition area.

Operation of the pump station would reduce (but not completely eliminate) flows in March, which is the beginning of the nesting season for snowy plovers on Owens Lake. Additionally, the seasonal habitat flow bypass would increase outflows to the brine pool transition area for short periods during the peak nesting season (May/June). However, while small numbers of snowy plovers have been observed in the brine pool transition area, no nests have been seen since operation of the Zone 2 shallow flood area began in the beginning of 2002. Since invertebrate food production in the brine pool transition area would not be substantially affected (see **Section 3.4.2.1**) and no snowy plovers are currently expected to nest in the brine pool transition area, implementation of the project would not adversely affect this species.

One bat species (spotted bat) designated by the CDFG as a Species of Special Concern has been found foraging over the riparian area and meadows of the Delta and many of the seeps and springs; it was also found over open playa in the northeast portion of the lake bed. The presence or absence of this species in the brine pool transition area is not known, but it is not likely to occur since unvegetated playa is not a preferred habitat for this species. Reduced flows in the winter (when bat activity is low) would not impact this species, whereas the increased availability of water to the vegetated wetlands of the Delta during the growing season may provide more foraging opportunities for this species.

Although not an agency-listed species or Species of Special Concern, two species of bats (small-footed myotis and Yuma myotis) may be considered sensitive or locally important species. Both species have been observed on unvegetated playa habitats in the Owens Lake. Presence of these species in the brine pool transition area is not known, but they may forage in the area for aerial insects. In the winter when temperatures are lower and food is less abundant, these species are likely to be inactive or to migrate out of the Owens Valley. Furthermore, as described above, reduction of the surface water in the brine pool transition area in the winter would not result in substantial reduction of invertebrate food sources for these species.

Alkali flats tiger beetle, slender-girdled tiger beetle, and Owens Valley tiger beetle have no official status but are endemic to the project area, and may be considered sensitive or locally important species. These species have been observed at Owens Lake, including seeps and springs and saltgrass-dominated Transmontane Alkali Meadow habitats. Presence of these species in the brine pool transition area is not known. Since implementation of LORP would increase flows during the warmer months (seasonal habitat flows and pulse flows), additional habitat for these species may be created in the brine pool transition area. Reduction of winter flows is not anticipated to affect the tiger beetles (if these species are present in the brine pool transition area under existing conditions).

Therefore, project-related impacts on sensitive species would be less than significant, and no mitigation is required.

3.4.2.3 Impacts on Migratory Corridors or Nursery Sites

There are no fish, amphibians or reptiles that use the brine pool transition area. Mammals may pass through the brine pool transition area in transition to other habitats. However, implementation of the proposed project would not obstruct their movement. With respect to birds, the Owens Lake as a whole is considered to be a part of the migratory pathway. However, implementation of LORP does not involve physical modifications or other creation of obstacles to migration in the Owens Lake. The alteration in the magnitude and timing of flows discharged from the Delta to the brine pool transition area would not interfere with the movement of wildlife species or migratory corridors.

The vegetated portions of the Delta are used by elk for calving; however, they are not known or expected to use the brine pool transition area due to lack of vegetation. While small numbers of snowy plovers have been observed in the brine pool transition area, no nests have been seen since operation of the Zone 2 shallow flood area began in the beginning of 2002 (see also **Section 3.4.2.2**). Therefore, operation of the pump station would not affect nursery sites.

Therefore, project-related impacts on wildlife movement, migratory corridors and nursery sites would be less than significant, and no mitigation is required.

3.4.2.4 Impacts on Federally Protected Wetlands

The brine pool is the area of the Owens Lake bed located below elevation 3,553.5 feet msl, which is designated as the ordinary high water mark by the U.S. Army Corps of Engineers and is thus considered a water of the U.S. (GBUAPCD, 1997; MHA Environmental Consulting, Inc. 1994, as cited in Regional Board, 2005a). As described above, the brine pool transition area is generally located in the northeastern portion of the brine pool and immediately south of the end of the vegetated portions of the Delta. Vegetation is absent in the brine pool transition area. The portion of the brine pool transition area below elevation 3,553.5 feet would be considered a water of the U.S.; however, no part of the brine pool transition area would be considered a federally protected wetland since it lacks the vegetative characteristic requisite for designation as a jurisdictional wetland by the U.S. Army Corps of Engineers. Therefore, no impacts on federally protected wetlands would occur, and no mitigation is required.

3.4.2.5 Consistency with Local Policies or Ordinances

Local plans and policies related to protection of biological resources are described in **Section 3.2.3.3.** Aside from the Inyo County General Plan [the project is consistent as discussed in Section 13 of the LORP Final EIR (LADWP, 2004a)], there are no local government policies or ordinances relevant to the brine pool transition area. However, there are two planning documents that address bird habitat of Owens Lake (U.S. Shorebird Conservation Plan and the Important Bird Area designation). The project would not conflict with these plans since it would not significantly affect the bird habitat of the brine pool transition area (see also **Section 3.4.2.1**).

3.4.2.6 Consistency with Adopted Habitat Conservation Plans

There are no adopted Habitat Conservation Plans, Natural Community Conservation Plans, or other approved local, regional or state habitat conservation plans that are applicable to the Project area, including the brine pool transition area. Therefore, the project would not conflict with such plans, and no impacts would occur. No mitigation is required.

3.4.3 Impacts on Hydrology and Water Quality

3.4.3.1 Water Quality

Operation of the pump station and release of River flows to the Delta would not include discharges of any wastes or significant changes to water quality of the flows reaching the brine pool transition area. During the winter, the lower volume of water reaching the brine pool transition area would result in shallower inundation and therefore potentially increase water temperatures under sunny weather conditions. During releases of higher flows (seasonal habitat flow bypass and pulse flows), depths in the rivulets of the brine pool transition area would increase and temperatures could potentially decrease. Water temperatures in the brine pool transition area would continue to fluctuate widely as under existing conditions. Therefore, impacts on water quality of the brine pool transition area would be less than significant.

Project implementation would have less-than-significant impacts on water quality and biological resources of the brine pool transition area (see **Section 3.4.2**). Enhancement of habitat quality in the Delta through flow management would be expected to enhance the existing beneficial uses of the Owens Lake wetlands related to habitat and recreation. Overall, implementation of LORP would maintain and enhance the beneficial uses of Owens Lake.

3.4.3.2 Groundwater Resources

As described above in **Section 3.2.2.3**, the general hydrologic gradient in the shallow groundwater of the lake bed is from the lake margins toward the brine pool, where water is discharged via evaporation. As with most of the lake bed, the brine pool transition area is saturated at or near the surface due to the upward gradient of groundwater, and groundwater is discharged from the area via evaporation. In addition, the Zone 1 and Zone 2 shallow flooding areas of the Dust Mitigation Program are located immediately to the northwest and northeast of the brine pool transition area (see **Figure 3-5**), and would also contribute to maintaining saturated conditions in the brine pool transition area. Therefore, under existing conditions, surface water inflows to the brine pool transition area are not expected to contribute to groundwater recharge.

As described above in **Section 3.4.1**, implementation of LORP would alter surface water conditions in the brine pool transition area, resulting in less flow in the winter months but similar or increased flow in the summer months. However, the brine pool transition area is currently saturated, and is expected to remain saturated under LORP due to the upward vertical gradient of groundwater in this area. Since surface water in the brine pool transition area is not recharging groundwater, alterations of surface flows in this area would not change groundwater recharge or water table conditions, and therefore would have no impacts on groundwater supplies.

Implementation of LORP would increase flows in the River (from an average of approximately 11 cfs at Keeler gage under existing conditions to the 40-cfs baseflow proposed under LORP). This increase in River flows would likely increase seepage to the alluvial materials north of the Delta, which in turn may increase recharge to the sediments underlying the brine pool transition area (and increase the upward gradient), although this effect is difficult to quantify. This increased recharge from the additional River flows may be expected to improve the water quality in the underlying groundwater basin, but would not change the non-potable character of the groundwater in the brine pool transition area which is influenced by the salt-laden sediments.

3.4.3.3 Drainage

Implementation of LORP would not require any construction or other development in the brine pool transition area, and therefore would not alter the existing drainage pattern of the area. Operation of the pump station as part of LORP would alter outflows to the brine pool transition area. As described above, outflows would be reduced in winter, similar in the summer, and increased over existing conditions during up to five times of the year – one seasonal habitat flow bypass and four pulse flows. Due to the low gradient and low velocities of these releases, impacts in the brine pool transition area related to erosion/siltation would be less than significant. Since the drainage pattern of the brine pool would not be affected by the project, there would be no impacts on stormwater drainage to the brine pool transition area.

3.4.3.4 Flooding

Relative to the brine pool transition area, operation of the pump station under LORP would not affect flooding or flood hazards. The project does not include the placement of housing within a flood hazard area or in any other way expose people or habitable structures to a risk of loss or injury from flooding, seiches, tsunami, or mudflows. There would be no impacts related to flooding.

3.4.4 Cumulative Impacts

A discussion of related projects that have the potential for cumulative impacts with LORP is presented in Section 12 of the Final EIR (LADWP, 2004a). Updated information is provided in this SEIR for the following related projects, which are relevant to impacts on the brine pool transition area:

- Owens Lake Dust Mitigation Program
- US Borax Trona Processing Upgrade Project
- Crystal Geyser Roxanne Beverage Bottling Plant

As described below, the cumulative effects of the proposed project with these related projects would not be cumulatively considerable and would result in less-than-significant cumulative impacts.

3.4.4.1 Owens Lake Dust Mitigation Program

As described above, a total of approximately 12,200 acres of shallow flood areas and 2,400 acres of managed vegetation have been completed to date as part of the Owens Lake Dust Mitigation Program. An additional 4,400 acres of shallow flooding (Dust Mitigation Program Phase V project) is expected to begin operation in November 2006 (see **Table 3-3** and **Figure 3-5**). Since the existing 12,200 acres of shallow flood areas and 2,400 acres of managed vegetation are considered existing conditions for the proposed project, only cumulative effects with Phase V are considered below.

An Initial Study and proposed Mitigated Negative Declaration for the Phase V project were prepared in June 2005 (LADWP, 2005c), and the Mitigated Negative Declaration was approved in September 2005 (LADWP, 2005d). The 4,400 acres of new shallow flood areas to be constructed as part of the Phase V project include areas adjacent to the existing Zones 1 and 2 shallow flood areas as well as southeastern and southern portions of the lake bed (see **Figure 3-5**). A portion of the new shallow flood areas (a portion of the area labeled "20" in **Figure 3-5**) would be located in the northeastern portion of the brine pool transition area. In addition, the Phase V project includes modifications (placing riprap on berms and modification to the pump system) of Zone 1 and the northern portion of Zone 2 (total of 2,844 acres).

Construction of Phase V is scheduled for 2006, and operation of the shallow flooding areas is expected to begin in November 2006, prior to operation of the pump station under LORP. Therefore, short-term construction effects (disturbance of snowy plover habitat) of the Phase V project would not be cumulative with the effects of the proposed project. Since snowy plovers are not currently expected to nest in the brine pool transition area, operation of the LORP pump station would not result in cumulative effects on snowy plover nesting habitat with operation of the Dust Mitigation Program. Operation of the Phase V project would expand the shallow flood areas that currently serve as habitat for large numbers of shorebirds and waterfowl and are located in close proximity to the brine pool transition area.

3.4.4.2 U.S. Borax Trona Processing Upgrade Project

The U.S. Borax Trona Processing Upgrade Project (U.S. Borax project) consists of upgrades to trona processing facilities located on or near the Owens Lake bed, including:

- Installation of mobile ore washing equipment on the southwestern portion of the lakebed (on or near the currently active mining panels)
- Installation of an artesian non-potable well on the lakebed near the currently active mining panels to supply water to the washing equipment
- Installation of an outfall for wastewater discharge onto the lakebed
- Installation of a calcining/drying facility within existing U.S. Borax facilities on the western lakeshore and associated pipelines, power transmission lines, and a potable water well

The upgrade would allow increased trona production to 144,000 tons per year (from the current 30,000 to 50,000 tons per year). Implementation of the upgrade would not increase the area to be mined beyond that already leased. The Draft EIR for the U.S. Borax project was prepared by Inyo County in January 2004 (Inyo County, 2004a), and the Final EIR was certified in May 2004.

The Draft EIR (Inyo County, 2004a) for the U.S. Borax project identified a potentially significant impact on snowy plover nests and nesting activity from increased truck traffic on the onsite haul roads located on the lake bed. Mitigation measures have been included as part of the U.S. Borax project to reduce the potentially significant impact to a less-than-significant level. Since snowy plovers are not currently expected to nest in the brine pool transition area, operation of the LORP pump station would not result in cumulative effects on snowy plover nesting habitat with the U.S Borax project.

3.4.4.3 Crystal Geyser Roxanne Beverage Bottling Plant

The Crystal Geyser Roxanne Beverage Bottling Plant is located 3.2 miles south of Olancha. The 120-acre project site extends west from the intersection of Highway 395 and the Aqueduct. The Crystal Geyser project consists of development and operation of a mineral water, juice, and tea beverage bottling plant, including importing fruit and tea concentrates to the project site and adding these concentrates to the well water.

The Draft EIR for the Crystal Geyser project was prepared by Inyo County in December 2004 (Inyo County, 2004b). Potential impacts to nesting birds during construction were found to be less than significant with mitigation (avoidance of breeding season and pre-construction survey); impacts to raptor foraging habitat were found to be less than significant due to the small acreage impacted by the project and the presence of large areas of similar, suitable foraging habitat in adjacent areas. Impacts to snowy plovers or other shorebirds were not identified. As described above, the possible reduction in the number of birds in the brine pool transition area in winter under the proposed would not substantially affect the food supply for birds of prey, and cumulative effects of the proposed project with the Crystal Geyser project would not be significant.

3.4.5 Growth-Inducing Impacts

An EIR shall include a discussion of the potential for growth-inducing impacts (Public Resources Code Section 21100). The focus of this analysis is on the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. As described in the LORP Final EIR Section 10.7 (LADWP, 2004a), implementation of the LORP would not result in growth-inducing impacts. Operation of the pump station and impacts to the brine pool transition area were included in this previous assessment. No additional consideration of the growth-inducing impacts is necessary.

3.4.6 Alternatives

Analysis within an EIR shall include a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives.

In addition to the No Project alternative, the LORP Final EIR (LADWP, 2004a) described an evaluation of three CEQA alternatives focused on reducing the significant environmental impacts of the proposed project, which are water quality degradation and fish kills during release of initial flows. The No Project alternative would avoid these significant short-term impacts but this alternative was not identified as environmentally superior to the proposed project since habitat conditions in the LORP area would not be enhanced. None of the alternative release regimes (gradual release, early flushing flow, or delayed baseflows) were identified as environmentally superior to the proposed flow release regime. Under these alternative flow regimes, outflows to the brine pool transition area would be the same as under the proposed project after year 3 of project implementation (and essentially the same for the first 3 years).

Additional NEPA alternatives were described in the Final EIR related to pump station size, physical modifications to the Delta, alternative releases for the seasonal habitat flows, alternative regimes for the pulse flows to the Delta, cowbird trapping, native fish stocking in Blackrock Waterfowl Habitat Area, modified flooding regime in Blackrock Waterfowl Habitat Area, and alternative sediment stockpiling sites. Of these NEPA alternatives, alternative release regimes for the seasonal habitat flows and the pulse flows, and potentially physical modifications to the Delta, would affect outflows to the brine pool transition area, the subject of this SEIR.

The alternative to physically modify the Delta was found to be infeasible and to result in new significant impacts (loss of wetland and playa habitats). The alternative seasonal habitat flow regime scenario (200 cfs maintained throughout the River) was rejected for the following reasons: impacts to habitats in the Delta could range from significant and adverse to beneficial, the alternative is not required to meet MOU requirements, and the alternative would not reduce any significant impact. Two alternative regimes for pulse flows were identified as NEPA alternatives. The first would slightly modify the timing of the four pulse flows and is considered a feasible adaptive management action that may be considered in the future. If implemented, this alternative could potentially reduce the volume of outflows to the brine pool transition area since fall and winter pulse flows would be released slightly earlier (August instead of September, and later October through November instead of November/December) when evapotranspiration rates are higher. The second NEPA alternative related to pulse flows includes six instead of four pulse flows (one for 10 days at 25 cfs, four for 10 days at 20 cfs, and one for 5 days at 15 cfs). This alternative is considered a feasible adaptive management action that may be considered in the future. While this proposed regime would potentially increase shallow flooding in the Delta (and therefore bird habitat), it would likely reduce outflows to the brine pool transition area since it would reduce the November/December 5-day pulse flow to 15 cfs (instead of 30 cfs).

Additional CEQA alternatives are not identified in this SEIR since additional significant effects of the project have not been identified. Discussion of alternatives in an EIR shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project (Public Resources Code Section 21002). Under LORP, impacts to hydrologic resources of the brine pool transition area and resultant impacts on biological resources would be less than significant as described above. Overall, the impacts of the project on biological resources including waterbirds would be beneficial. Alternatives focused on avoidance or reduction of the significant environmental effects of the project related to water quality degradation and fish kills during initial releases were sufficiently analyzed in a previous document (LORP Final EIR, LADWP, 2004a). Therefore, additional alternatives (in addition to the alternative discussed in the LORP Final EIR) have not been defined or analyzed in this SEIR.