OWENS LAKE HABITAT MANAGEMENT PLAN

Prepared by
Los Angeles Department of Water and Power

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Owens Lake Habitat Management Plan Acronyms

2008 SIP FSEIR 2008 State Implementation Plan Final Subsequent Environmental Impact Report

BACM Best Area Control Measure

BMPs Best Management Practices

CDFG California Department of Fish and Game

CSLC California State Lands Commission

City City of Los Angeles

CIR color infrared

CRWQCB California Regional Water Quality Control Board

DAM Dry Transmontane Alkali Meadow

DCA Owens Lake Dust Control Area

DCMs Dust Control Measures

DHA Delta Habitat Area

District Great Basin Unified Air Pollution Control District

DMU drain management units

EC electroconductivity

FESA Federal Endangered Species Act

gpm gallons per minute

HMP Habitat Management Plan

HSF Habitat Shallow Flood

LAA Los Angeles Aqueduct

LADWP Los Angeles Department of Water and Power

LORP Lower Owens River Project

MAM Moist Transmontane Alkali Meadow

MDCE minimum dust control efficiencies

MND North Sand Sheet and Southern Zones Mitigated Negative Declarations

NAAQS National Ambient Air Quality Standards

NSS North Sand Sheet

OLHMP Owens Lake Habitat Management Plan

PM_{10} particulate matter under 10 microns

PRBO Point Reyes Bird Observatory

Project Owens Lake Dust Mitigation Project

SAM Saturated Transmontane Alkali Meadow

SZDCP Southern Zone Dust Control Project

SCADA Supervisory Control and Data Acquisition

TAM Transmontane Alkali Meadow

TDS Total Dissolved Solids

1.0 INTRODUCTION

This document describes the Owens Lake Habitat Management Plan (OLHMP) for the Owens Lake Dust Mitigation Project (Project). This plan is a requirement of Mitigation Measure Biology-14 of the 2008 State Implementation Plan Final Subsequent Environmental Impact Report (2008 SIP FSEIR). The overall goal of the plan, as stated in the 2008 SIP FSEIR is to avoid direct and cumulative impacts to native wildlife communities that may result from the Project. As noted in Mitigation Measure Biology-14, the plan will apply to all emissive areas subject to dust control measure on lands owned by either the City of Los Angeles (City) or the California State Lands Commission (CSLC). The OLHMP was developed by staff of LADWP.

The OLHMP will serve as a guide for compatibility between construction, maintenance, and operational needs of the Project under the 2008 SIP FSEIR, and the needs of resident and migratory wildlife resources utilizing the Owens Lake Dust Control Area (DCA). The wildlife habitat management concepts incorporated will be compatible with everyday dust control operations without unreasonably affecting Los Angeles Department of Water and Power's (LADWP's) ability to operate and maintain dust control facilities. This plan recognizes that in the future, alternative dust control measures (DCMs) or refinements of current DCMs may be pursued that are either more effective from a dust control perspective or obtain the same dust control results but in a more water efficient manner. Therefore, since dust control measures may change over time, management recommendations will be geared toward specific dust control measure types and operations, and not specific areas on the lakebed (with the exception of specific areas described below).

Implementation of water-based dust control inadvertently created habitat opportunities for wildlife that were previously not present. In most of the DCA however this change was purely incidental. The design and purpose of DCMs, including shallow flood, was for their dust control function. As dust control on Owens Lake moves forward LADWP must now find ways to achieve dust control goals in a more water efficient manner for a variety of reasons, not least of which is the complex of state-wide impacts associated with water supply management. As changes are planned and implemented we must be cognizant of the ecological values in the DCA and seek to sustain them at a reasonable level in a more water efficient manner. The exact form of the facilities has yet to be determined. As long as planning and implementation of these changes proceeds in an integrated manner all legitimate ecological, dust control, and water conservation goals should be feasibly achieved.

1.1. Background

LADWP is implementing the dust control at Owens Lake, as mandated in the 1998 Memorandum of Agreement between the City and the Great Basin Unified Air Pollution Control District (District). The Project involves implementation of DCMs on emissive portions of the lakebed to control fugitive dust (also known as PM_{10}), in order to protect human health.

DCMs are defined as those measures of PM_{10} abatement that could be placed onto portions of the playa, and when in place, are effective in reducing the PM_{10} emissions from the surface of the playa. Since 1989, the District has pursued a comprehensive research and testing program to develop PM_{10} control measures that are effective in the Owens Lake playa environment. The District, in cooperation with LADWP, has developed three PM_{10} control measures that it has found to be feasible and effective: shallow flooding, managed vegetation, and gravel cover. In addition, the 2008 SIP FSEIR includes a new alternative DCM known as moat and row.

Construction of DCMs by LADWP at Owens Lake began in 2000. From 2000-2006, dust mitigation involved construction of approximately 29.8 square miles of DCMs implemented in phases. Currently, shallow flooding or surface water ponding is being used on approximately 25.9 square miles, managed vegetation on 3.5 square miles, and gravel on 0.1 square miles. As part of Phase VII, an additional 13.2 square miles of DCMs is to be implemented by the end of 2010. The additional 13.2 square miles will consist of 9.2 square miles of shallow flood, 0.5 square miles of channel area, and 3.5 square miles of moat and row. An additional 1.9 square miles of study area has also been identified where there is a suspicion of dust emissions and where either the location or magnitude of emissions is uncertain.

Further discussion regarding the Project background and specific DCMs are provided in the 1997 Environmental Impact Report (EIR) (District, 1997), North Sand Sheet and Southern Zones Mitigated Negative Declarations (MND) (LADWP 2000 and 2001), 2003 State Implementation Plan (SIP) Final Environmental Impact Report (FEIR) (District 2003), Phase V MND (LADWP 2005), 2008 SIP FSEIR (District 2008), and 2009 Moat and Row FSEIR (LADWP 2009).

Prior to implementation of the dust control project, Owens Lake consisted of a large expanse of barren playa, a remnant hypersaline brine pool, and scattered springs and seeps along its shoreline. Wildlife was encountered primarily in association with seeps and springs and the Owens River delta area. The implementation of DCMs has resulted in an increase in the use of Owens Lake by many wildlife species as water and vegetation resources are now present on much of the former barren playa.

During the pre-project period, it was recognized that certain special status species (such as Snowy Plover) used existing springs and seeps and adjacent playa for nesting and foraging. Initial environmental documents contained mitigation measures associated with operations and maintenance of DCMs in order to avoid impacts to these sensitive species. The potential increase in use of the lakebed by some species, such as the Common Raven, resulted in additional mitigation measures being added to subsequent environmental documents.

Mitigation Measure Biology-14 was a component of the most recent environmental analysis contained within the 2008 SIP FSEIR. Since no justification was provided as to the necessity of Biology-14, the need for the OLHMP can only be inferred to be based on the long-term compatibility of increased use of the Project area by wildlife and of the operation and maintenance of DCMs. As the use of DCMs by wildlife increased, concerns have also been raised by various parties concerning impacts to wildlife that may occur if specific dust control methods are changed from one more attractive to wildlife (e.g. shallow flooding) to one less attractive (such as gravel), since LADWP has the option of using any of the three currently-approved methods to control dust. In order to protect some of the newly-created habitats in DCMs and the wildlife species now using these areas, additional mitigation measures were required in subsequent SIP EIRs. These mitigation measures include the management of 1,000 acres in perpetuity for shorebirds and Snowy Plovers in Zone II, and the creation of 145 acres of habitat shallow flood suitable for shorebird foraging. Additional dedicated habitats as well as previously required management areas became components of mitigation for Phase VII, and are a component of Biology-14.

The specific requirements of Biology-14, as stated in the 2008 SIP FSEIR, are as follows:

- Within the Environmental Impact Report analysis areas for 2008 State Implementation Plan dust controls (Figure 2.1-3), achieve no net loss of riparian or aquatic baseline habitat functions and values or total acres of these habitats.
- Manage 1,000 acres in perpetuity for shorebirds and Snowy Plovers in Zone II, in consultation with the California Department of Fish and Game.
- Pursuant to Condition No. 16 of the 2001 Streambed Alteration Agreement (Agreement No. R6 2001-060, page 5), the project was expected to adversely impact 63 acres of shorebird foraging habitat at Dirty Socks Spring. Therefore, the City of Los Angeles Department of Water and Power was required to create 145 acres of Habitat Shallow Flood suitable for shorebird foraging. The City of Los Angeles Department of Water and Power has currently created 152 acres. If the City of Los Angeles Department of Water and Power proposes to discontinue using the 145 acres or any portion thereof the Habitat Shallow Flood for shorebird foraging habitat, the City of Los Angeles Department of Water and Power shall provide shorebird foraging habitat of equivalent quality at a ratio of 1:1 to 2:1 as determined through coordination between the California Department of Fish and Game and the City of Los Angeles Department of Water and Power.
- In consultation with the California Department of Fish and Game, develop a specification for an appropriate amount of deep-water habitat and then develop and manage that deep-water habitat in perpetuity in order to support focal migratory water birds determined to be present during 1995-1997 baseline surveys in support of the 1998 State Implementation Plan. This shall include a variety of water birds that use Owens Lake as a temporary stopover habitat during spring and autumn migration; water birds that are adapted to saline conditions such as eared grebe (*Podiceps nigricollis*), Wilson's phalarope (*Phalaropus tricolor*), and California gull (*Larus californicus*); and other water birds including waterfowl that can tolerate saline or brackish conditions such as gadwall (*Anas strepera*) and lesser scaup (*Aythya affinis*), among other species.
- Maintain a baseline population of 272 Snowy Plovers.
- In addition to the 1,000 acres of shorebird and Snowy Plover habitat in Zone II, the City of Los Angeles Department of Water and Power shall maintain a minimum of 523 acres of habitat specifically for Snowy Plovers in perpetuity at Owens Lake in consultation with the California Department of Fish and Game. Suitability of shallow flooding habitat for Western Snowy Plover consists of a mix of exposed sandy or gravelly substrate suitable for nesting in close proximity to standing water equal to or less than 12 inches in depth.
- Ensure that the approximately 17.5 acres of proposed dust control measures that are within California Department of Fish and Game Cartago Springs Wildlife Area are compatible with the designated land use. The California Department of Fish and Game has determined that Habitat Shallow Flood or habitat restoration would be compatible with the Cartago Springs Wildlife Area's designated use.

This document is provided to satisfy the requirements of Mitigation Measure Biology-14 (2008 SIP FSEIR) for all emissive areas subject to dust control measures on lands owned by the CSLC and lands owned by the City.

The 1997 Environmental Impact Report (EIR) (District, 1997), North Sand Sheet and Southern Zones Mitigated Negative Declarations (MND) (LADWP 2000 and 2001), 2003 State Implementation Plan (SIP) Final Environmental Impact Report (FEIR) (District 2003), Phase V MND (LADWP, 2005), and 2008 SIP FSEIR (District 2008), including any subsequent addenda or modifications, and relevant permits will be the guiding documents for plover protection and other mitigation measures and, as such, supersede any requirements, direct or implied, in the OLHMP.

1.1.1. Geographic Setting and Scope

The Owens Lake bed is located at the south end of the Owens Valley, with the Sierra Nevada to the west, the Inyo Mountains to the east, and the Coso Range to the south. Owens Lake is approximately four miles south of the town of Lone Pine, and is bordered on the west by U.S. Highway 395 (US 395) and on the east by State Route 190 (SR 190). The lake bed is approximately 110 square miles in size, 17 miles north to south and 10 miles east to west. The historic shoreline is considered to be 3,597 feet above mean sea level. Although historic lake levels were as high as 3,597 feet in 1878, surface water diversions over the past 125 years have reduced the lake to less than one third of its original area and about 5% of its original volume. From the 1860s to the early 1900s, withdrawals from the Owens River for agricultural purposes substantially reduced surface water inflow to the lake. Extensive irrigation projects compounded by drought caused the lake level to drop as low as 3,565 feet in 1906. However, by 1912, as the drought ended, the level had risen to 3,579 feet. In 1913, the City completed the Los Angeles Aqueduct (LAA) and began diverting waters of the Owens River exporting it 223 miles south to the City. By the 1920s, Owens Lake had shrunk to a small hypersaline remnant brine pool approximately 25 square miles in size and a few feet deep. Demand for exported water increased as Los Angeles grew and as diversions for irrigation continued in the Owens Valley (mainly on City-owned property). These factors resulted in Owens Lake becoming virtually dry by 1930; its level having dropped to an elevation of 3,554 feet (2008 SIP FSEIR).

The brine pool exists in the lowest portion of the basin and begins at the high water mark of 3,553.55, as defined by the U.S. Army Corps of Engineers. This brine pool can fluctuate substantially based on the amount of precipitation received in a year and seasonally due to evaporation rates. At the high water mark it occupies 25 square miles. This brine pool supports little life as the concentration of dissolved solids can be a high as 77% by weight, averaging approximately 15 times the salinity of seawater.

The Owens River delta is in the mouth of the Owens River on the Owens Lake bed. Under the Lower Owens River Project (LORP), the Owens River delta is known as the Delta Habitat Area (DHA). Based on 2005 inventory, the DHA supports 755 acres of wetland habitats including alkali meadow, wet alkali meadow and marsh. A narrow riparian corridor along the terminus of the Owens River lies at the north end of the DHA. At the southern end of the DHA is the delta to brine pool transition area, where flows from the Owens River spread onto barren playa and eventually flow to the brine pool. Management of the DHA is defined by the LORP and the DHA is outside the scope of the OLHMP.

DCAs exist around the north, east and south edges of the brine pool transition area that contains emissive saline soils. By 2010 the DCA, with dust control implemented, will cover approximately 43 square miles. The City owns a small portion of the land designated by the District for dust control with the majority controlled by CSLC.

1.2. Goals and Requirements

The overall goal of the OLHMP is to avoid direct and cumulative impacts to native wildlife communities that may result from the Dust Control Program (2008 SIP FSEIR). In addition, this Plan seeks to manage resources on Owens Lake used to control fugitive dust in a manner that is compatible with wildlife needs to the extent possible. This plan will discuss how operation and maintenance of each of the DCMs used on Owens Lake will be performed to accommodate wildlife use. Impact avoidance to vegetation and wildlife has been addressed through various mitigation measures. This plan will address these practices as well as discuss the management goals of each habitat type inside each type of DCM. The impacts to habitats by construction of DCMs by various phases of the dust control project are summarized in Table 1.

Table 1. Impacts of Various Habitat Types by the Dust Control Project

	Habitat Type (acres)			
Environmental Document	DAM	MAM	SAM	Shorebird Habitat
1997 EIR	91.6	0	0	0
Southern Zones MND	5.6	0	0	0
2003 SIP FEIR	87.2	27.7	6.6	0
Phase V MND	0.1	0	0	0
CDFG 1601 Agreement R6-2001-060				63
2008 SIP FSEIR	TBD	0	0	0
Total to Date	**184.5**	**27.7**	**6.6**	**63**
***Acreages show overlap with dust control areas but were not necessarily negatively affected by construction and operation*				

1.2.1. Transmontaine Alkali Meadow

Transmontaine Alkali Meadow (TAM) wetlands on Owens Lake occur along a hydrologic gradient, ranging from seasonally moist to occasionally inundated to perennially saturated. All impacts to Dry, Moist, and Saturated Transmontaine Alkali Meadows have been mitigated for by creating these communities inside of the DCA.

Dry Alkali Meadow (DAM) consists mainly of inland saltgrass (*Distichlis spicata*) and is the most common vegetative community on the lakebed. DAM occurs on the relatively drier areas of the hydrologic continuum with TAM. The total acreage of DAM impacted by the Project is 184.5 acres. The equivalent of DAM (2008 SIP FSEIR) has been created in the DCM managed vegetation whereby the vegetative cover grown is used to stabilize the lakebed surface. Acreage and cover requirements are in place to ensure managed vegetation does not become emissive and habitat functions and values are maintained. LADWP has currently created 2,260 acres of managed vegetation and maintains an average cover of 42% total vegetative cover based on satellite imagery analysis (Newfields 2007). Vegetative cover is equal to or greater than what is common in native DAM thus providing similar habitat structure and habitat diversity. This managed vegetation also supports wildlife species associated with DAM. The managed vegetation that has been planted has greatly increased the habitat values of the area over the pre-project condition of barren playa.

Moist and Saturated Transmontaine Alkali Meadow (MAM and SAM, respectively) are more diverse than DAM; the majority of these communities support at least two species with some SAM areas consisting of more than four species. Because of the greater plant diversity, SAM wetlands have some vegetative structural diversity. The majority of MAM wetlands have at least two plant species, but these species generally have the same growth form and, therefore, MAM wetlands exhibit little structural diversity.

The total acreage of MAM and SAM communities impacted by the Project is 27.7 and 6.6 acres, respectively. These 34.3 acres of habitat have been replaced in the northernmost portion of the T30-1 area by approximately 40 acres that were developed in 2007. This created wetland area has been increasing in cover and many individuals of each species are beginning to set seed. The area is rapidly expanding southwest, through recruitment of wetland vegetation as seeds are dispersed in water flowing down gradient from the created wetlands. Wetland vegetation will continue to spread to the majority of the 692 acres in the T30-1 dust control cell except for the deeper portions of the tailwater pond in the southwestern portion of the cell. Operation of shallow flood laterals in T30-1 will continue to wash the previously bare playa of salts and reclaim the soils for further vegetation growth. This will increase the diversity and productivity of habitat in the area.

1.2.2. Shallow Flood

This DCM consists of applying water to emissive areas of the lakebed. As currently configured shallow flood is divided into areas or cells that experience sheet flow from lateral pipes that flow down gradient into tailwater ponds and dust control cells that are one relatively continuous pond. By 2010 approximately 35.6 square miles of previously barren playa will contain these two types of shallow flood.

This DCM provides an array of foraging and nesting habitat for upwards of 100 bird species. Thousands of migratory water birds use this area as foraging habitat during spring and fall migration. The most common water birds include California Gulls, American Avocets, Eared Grebes, various small sandpipers (*Calidris* spp.), phalarope species, and many species of ducks and geese (waterfowl). The Northern Shoveler (*Anas clypeata*) is one of the most common fall migrant duck species with over 35,000 individuals observed in one fall 2008 survey. Many resident shorebirds breed at Owens Lake including American Avocets (*Recurvirostra americana*), Black-necked Stilt (*Himantopus mexicanus*), Killdeer (*Charadrius vociferous*) and Snowy Plover (*Charadrius alexandrinus*).

The Snowy Plover has a significant breeding population on Owens Lake. These shorebirds nest and forage in shallow flood DCMs. LADWP will maintain at least 272 Snowy Plovers as determined during dedicated annual surveys.

The main foraging resource of water birds in the shallow flood areas are larvae and adult brine flies (*Ephydra* sp). Brine flies are an important resource in the near shore and shallow saline water in shallow flood areas. Water quality will be managed within constraints for dust control for a productive and diverse invertebrate community. Water quality and the food organisms are monitored for various naturally occurring trace elements to ensure there is no toxic accumulation of these elements. This DCM will be managed for habitat quality to sustain and possibly enhance waterbird foraging and nesting habitat while reducing water used for dust control.

Certain shallow flood cells are managed as waterfowl and shorebird habitat. These are discussed below.

1.2.3. Designated Habitat of 1000 Acres

California Department of Fish and Game (CDFG) and LADWP entered into Lakebed Alteration Agreement No. R6-2001-060 for the Southern Zone Dust Control Program (SZDCP) because of impacts to the dry lakebed considered by CDFG to be jurisdictional under Section 1600 et seq. of the California Fish and Game Code. In addition, the CSLC issued an Amendment of Lease PRC 8079.9 (State Lands Lease) for construction and operation of SZDCP components that occur on state land on the Owens Lake. Measures were required in these documents to set aside and manage an area that would be dedicated as Western Snowy Plover (*C. a. nivosus*) and shorebird nesting and foraging habitat in perpetuity. This requirement was based on insufficient data available on the extent of shorebird use of a portion of the SZDCP area in the southeastern portion of Owens Lake.

A Habitat Management Plan (HMP) was completed for this designated habitat in 2004 as part of requirements in the Lakebed Alteration Agreement No. R6-2001-060 with CDFG. Information such as future goals and methods for maintaining the habitat contained therein is included in this OLHMP when appropriate. This habitat is located in Shallow Flood DCA cell T23NE, T23NW, T23SE, and T23SW which together cover approximately 1183 acres.

1.2.4. Habitat Shallow Flood of 143 Acres

Pursuant to Condition No. 16 of the 2001 Streambed Alteration Agreement (Agreement No. R6-2001-060, page 5), the Project was expected to adversely impact 63 acres of shorebird foraging habitat at Dirty Socks Spring. Therefore, LADWP was required to create 145 acres of habitat shallow flood suitable for shorebird foraging. LADWP has currently created 152 acres.

Shallow Flood DCA cell T4-3 has been designated as this shorebird foraging habitat.

1.2.5. Snowy Plover Habitat of 523 Acres

LADWP is required to maintain a minimum of 523 acres of habitat specifically for Snowy Plovers in perpetuity at Owens Lake in consultation with CDFG. Suitability of shallow flooding habitat for Western Snowy Plover consists of a mix of exposed sandy or gravelly substrate suitable for nesting in close proximity to standing water equal to or less than 12 inches in depth (2008 SIP FSEIR District).

1.2.6. Deep Water Habitat

Under the 2008 SIP FSEIR, LADWP will develop and manage an appropriate amount of deep-water habitat in perpetuity in order to support focal migratory water birds determined to be present during 1995–1997 baseline surveys in support of the 1998 State Implementation Plan. This shall include a variety of water birds that use

Owens Lake as a temporary stopover habitat during spring and autumn migration; water birds that are adapted to saline conditions such as Eared Grebe (*Podiceps nigricollis*), Wilson's Phalarope (*Phalaropus tricolor*), and California Gull (*Larus californicus*); and other water birds including waterfowl that can tolerate saline or brackish conditions such as Gadwall (*Anas strepera*) and Lesser Scaup (*Aythya affinis*), among other species.

1.2.7. Cartago Springs Wildlife Area

Ensure that the approximately 17.5 acres of proposed dust control measures that are within CDFG Cartago Springs Wildlife Area are compatible with the designated land use. CDFG has determined that habitat shallow flood or habitat restoration would be compatible with the Cartago Springs Wildlife Area's designated use.

2.0 BASELINE RESOURCES

Prior to implementation of the Project, the majority of areas within the footprint of DCAs were composed of bare playa. This unvegetated habitat provided limited resources for wildlife, particularly when dry. Seasonally, some areas adjacent to seeps and springs contain standing or flowing water. When wet, barren playa will support various diatoms and cyanobacteria that lie dormant when dry and then continue growing when inundated. These organisms provide food for various invertebrates which, in turn, offer a food source for a variety of birds or other wildlife.

Pre-project surveys for biological resources were conducted within the entire study area, which included all areas bounded by State Route 136 (SR 136) to the north , State Route 190 to the south, U.S. Highway 395 to the west, and a few upland areas east of SR 136 that were proposed gravel extraction sites. Habitats surveyed during baseline studies included Alkali Seeps, Willow-Cottonwood Riparian Forest, Transmontane Alkali Meadow (TAM), playa and many upland scrub communities including Shadscale Scrub, Desert Saltbush Scrub and Desert Sink Scrub. The Project area, which was defined as those areas expected to be directly or indirectly altered by the proposed Project, included 35 square-miles of the Owens Lake.

The Project area for DCMs implemented under the 1998 SIP EIR was dominated by dry, unvegetated playa, which comprised approximately 98% of the Project area (over 22,000 acres). The remaining habitats of the Project area included Shadscale Scrub (less than135 acres), sand dunes (70 acres) and TAM (15 acres).

The supplemental Project area under the 2003 SIP EIR consists of 3,509 acres. The Project area for this phase of the dust control project was also dominated by playa (93%). Other vegetative communities in 2003 SIP Project Area include Desert Saltbush Scrub (40 acres), Desert Sink Scrub (2.5 acres), Dry Transmontane Alkali Meadow (DAM) (102 acres), Moist Transmontane Alkali Meadow (MAM) (27.7 acres) and Saturated Transmontane Alkali Meadow (SAM) (6.6 acres). Not all of the above acreage of vegetative communities in the Project area was impacted by construction.

Supplemental dust control will be constructed on an additional 12.7 square miles under the 2008 SIP FSEIR. Approximately 91% of the 9,344 acres within the 2008 SIP Project area is playa. The vegetative community of DAM covers 413 acres, only a portion of which will be impacted by construction.

The majority of pre-dust control project wildlife surveys occurred at various lake-fringing seeps and springs or riparian habitats where conditions are quite unlike those created by dust control efforts. The baseline data presented below describes the biological resources found in habitats within the Project area.

Pre-project baseline bird surveys were conducted in all plant communities within the study area and Project area between August 1995 and June 1996 (District 1998). Surveys were conducted at various times of the year, and were scheduled to detect spring and fall migrants, breeding birds, and overwintering species. A description of the bird species associated with the Project area habitats during baseline surveys is below.

Baseline bat surveys consisting of acoustical surveys, mist-netting, and direct observation were conducted during fall of 1995 and spring of 1996.

Herpetofauna were surveyed by pitfall trapping, walking transects, and night driving adjacent highways during the baseline time period.

2.1. Project Area Plant Communities

2.1.1. Playa

The dominant pre-project habitat was barren playa. As stated above, playa habitats comprised approximately 98% of available habitat in the Project area. Playa primarily represents areas of the Owens Lake bed that were exposed as the lake dried. Whereas many playas in the west produce little dust owing to the stability of their halite crusts, salts found at the surface of Owens Lake playa are salts of sodium carbonate and sodium sulfate. These later salts form a friable crust that is easily eroded by sand saltation. As a result, evaporation of the underlying groundwater leading to the subsequent precipitation of salts is an important process in the formation of dust from Owens Lake. As part of the baseline studies, surface soils, depth to ground water, and groundwater electroconductivity (EC) were also documented. The seven sub-environments within the Project area that were defined based on surface morphology, sediment type, and location; were the Northeastern Sand Sheet (NSS), Keeler Transition Zone, Crusted Clay Area, Salt Pan, Southeastern Shoreline Zone, Southern Transition Zone, and Southern Sand Sheet as described in 1997 SIP FEIR (District). Many of these zones are now covered by dust control.

The NSS area was found to be composed of fine to coarse sands and fine gravels. Groundwater levels in the NSS were shallow at 2-4 feet. The EC values indicate that salinity levels increased from east to west, with EC values of 1-10 mS/cm near the shoreline to 90-160 mS/cm at the western edge of the NSS, closer to the center of the lake. Another feature of the NSS area was a series of vegetated spring mounds along a fault zone. These spring mounds are small, ranging from 9- to 90-m^2, and generally covered with inland saltgrass. Many of these features now exist within DCAs.

The Keeler Transition Zone consisted of wind-blown sands originating from the NSS, on top of lakebed clays and silts. The groundwater levels are also generally shallow at 2-4 feet, with a high EC of 90 to greater than190 mS/cm.

The Southern Sand Sheet is composed of sand-sized particles that contain a high proportion of salt, oolites, and clay aggregates. The groundwater is typically at 3-4 feet. EC values are extremely high, often exceeding 160 mS/cm.

The Crusted Clay Area is composed of clays with a salt crust layer, which compose a large proportion of the lakebed. Despite the fact that the groundwater level is typically greater than 10-16 feet, the surface soils have high moisture content. The EC of the groundwater is 80-110 mS/cm.

The Southern Transition Zone consisted of clays covered with aeolian sand. The groundwater level was below 10 feet, and EC from 80-100 mS/cm during pre-project monitoring.

The Southeastern Shoreline Zone is a narrow band along the historic shoreline that was found to have a high water table, generally less than 3 feet below the surface. The surface soils were a mixture of fine to coarse sands mixed with silts and clays. EC levels were low closest to the shoreline (less than 20 mS/cm) and increase to between 50 and 140 mS/cm on the playa.

The Salt Pan Area is a thin band that exists between the brine pool and the crusted clay areas. This is an area of well-developed salt crusts that vary from a few inches to several feet, overlaying lake bed sediments. Groundwater levels are generally within a few feet of the surface, and the EC is high at 130-150 mS/cm.

The majority of playa areas were dry before water was added to control dust. Water flows onto the lake from isolated seeps and springs, uncapped wells (such as Sulfate Well), and flow from the Owens River at the delta and from Cartago creek onto playa on the southern end. Periodic and sometime intense storm flows cover parts of the lake from surrounding watersheds. Some areas of playa support diatoms and cyanobacteria which lay dormant when the playa is dry. When wet, these organisms become active and provide food for invertebrates, which in turn support other wildlife species.

2.1.2. Transmontane Alkali Meadow

The TAM plant community can be further divided into three sub-community types according to levels of soil saturation and salinity: SAM, MAM, and DAM. Only a small amount of TAM was documented as occurring within the Project area. The DAM sub-community type extends furthest onto the lakebed and playa, and was the most likely plant community to be encountered within the Project area.

Saltgrass (*Distichlis spicata*) dominates the DAM habitat sub-type. The most common co-occurring plant species in DAM after saltgrass are alkali pink (*Nitrophila occidentalis*), shadscale (*Atriplex confertifolia*), and Parry's saltbush (*Atriplex parryi*) and other occasional upland species. These other species generally occur on slight rises within the saltgrass clumps. The DAM sub-community grades into MAM in areas closer to seeps and springs. MAM is characterized by perennial moist soils. Unlike DAM, the plant community is not dominated solely by saltgrass, but other wetland species, adding to the diversity, including yerba mansa (*Anemopsis californica*) and alkali pink. Additional species occur in low numbers including three-square (*Schoenoplectus pungens*) or (*Schoenoplectus americanus*) and baltic rush (*Juncus balticus*), which become more common with an increased hydrological connection to freshwater springs or seeps. In SAM areas bulrush (*Schonenoplectus* sp.) becomes dominant with occasional presence of cattails (*Typha spp.*).

MAM and SAM communities are more diverse than DAM; the majority of these wetlands support at least two species with some SAM areas consisting of more than four species. Because of the greater plant diversity, SAM wetlands have greater vegetative structural diversity. The majority of MAM wetlands have at least two plant species, but these species generally have the same growth form and, therefore, exhibit little structural diversity. (LADWP 2002)

2.1.3. Upland Scrub Communities

All of the various upland scrub communities in the Study Area were described as Shadscale Scrub in 1997 SIP FEIR. Perennial plant species commonly found in the Study Area are greasewood (*Sarcobatus vermiculatus*) and Parry's Saltbush (*Atriplex parryi*) with Inland Saltgrass and bush seepweed (*Suaeda moquinii*) observed less frequently. Along with Shadscale Scrub two other similar upland communities were identified: Desert Saltbush Scrub and Desert Sink Scrub.

2.1.4. Shadscale Scrub (Element Code 36140)

Shadscale Scrub consists of low intricately branched, often spiney shrubs usually well-spaced with bare ground between dominant shadscale and budsage (*Artemesia spinescens*). While the Shadscale Scrub community may be found adjacent to playa, meadow habitats, or riparian habitats in poorly drained alkaline basins, around Owens Lake it is more commonly found on well-drained alluvial fans.

2.1.5. Desert Saltbush Scrub (Element Code 36110)

Desert Saltbush Scrub is characterized by low shrubs up to 1 meter in height, dominated by one or more saltbush (*Atriplex*) species. Total cover is low with large amounts of bare ground between shrubs. Saltgrass may be present among an open canopy along with seasonally present annuals. The Saltbush Scrub within in the Project vicinity is dominated by Parry's saltbush and greasewood, with saltgrass occasionally present.

2.1.6. Desert Sink Scrub (Element Code 36120)

Desert Sink Scrub is characterized by low shrubs up to 1 meter in height. Total cover is low with large amounts of bare ground between shrub species. Succulent chenopods are dominant. This series is characterized by low shrubs, less than 3 meters in height with a continuous or open canopy. Greasewood is typically the sole or dominant shrub in the canopy. The Desert Sink Scrub in the vicinity of the Project area is dominated by Parry's saltbush, but in contrast to Desert Saltbush Scrub, the presence of additional Atriplex species, greasewood (*S. vermiculatus*), and seepweed (*S. moquinii*) is significant. Wind blown hummocks and alkali slicks are common.

2.2. Wildlife-Plant Community Associations – Baseline Conditions

2.2.1. Playa

Barren playa can support a variety of invertebrate species, with the species richness and diversity expected to be higher in areas where standing water of appropriate salinity exists. Several species of brine and shore fly were identified at Owens Lake during baseline surveys, including *Ephydra hians*, *E. auripes*, *Lamproscatella (Halosccatella) salinaria*, *Ptilomtia occidentalis*, and *Paracoenia* sp. (Herbst 1997). Brine and shore flies (Ephydridae) were found to be locally abundant in areas where streams or springs discharged onto alkali playa. A variety of other invertebrate species were collected in playa areas supporting standing water including midges (Family Chironomidae), water boatmen (Family Corixidae), water scavenger beetles (Family Hydrophilidae), and backswimmers (Family Notonectidae), among others.

On playa areas that were seasonally moist or saturated, four species of tiger beetles were found: *Cicindela tranquebarica inyo*, *C. tenuicincta*, *C. willistoni psudosinilis*, and *C. haemorrhagica. C. haemorrhagica* is abundant and widespread throughout the southwestern U.S. The other three species are limited and patchy in their distribution in the west. Both larvae and adult tiger beetles prey on small insects. These beetles can complete their entire life cycle on the lakebed. Tiger beetles are associated with damp areas due to their need for softened soil to form burrows and for small insects to prey upon.

The Owens Valley tiger beetle (*C. tranquebarica inyo)* was found on wet unvegetated playa, in close proximity to TAM. The Slender-girdled tiger beetle *(Cicindela tenuicincta)* is a species that has no official sensitive species status, but is endemic to the Owens Valley and is therefore included in this description of sensitive invertebrate species. This species is found almost exclusively on damp unvegetated playa. The Alkali Flats tiger beetle *(Cicindela willistoni pseudosenilis),* although having no official sensitive species status, is another invertebrate species that is endemic to the Owens Valley and therefore is included in this description of sensitive invertebrate species. This species is found almost exclusively on damp unvegetated playa. It is known from Owens Valley, and its distribution may be limited to Owens Lake (Cazier 1939).

The 1997 EIR (District) provides a description of the herptofaunal community associated with playa. The discussion of herptofauna associated with playa is limited to a discussion of sensitive species. No sensitive species were found in playa habitats during baseline surveys. Use of playa areas by reptiles and amphibians is expected to be limited. There are no amphibians known or expected to use playa habitats. Diurnal lizards and snakes in adjacent shrub communities may venture onto barren alkali playa, but are not expected to be found far from vegetated communities. Species which may be found on playa adjacent to shrub communities include Zebra-tailed Lizard (*Callisaurus dracanoides*), Side-blotched lizard (*Uta stansburiana*), Western Whiptail (*Aspidospelis tigris*), Coachwhip (*Masticophis flagellum piceus*), and Gopher snake (*Pituophis catenifer deserticola*).

During the baseline surveys, the dry playa areas were found to support very few bird species. Bird species found to be associated with dry playa were primarily Killdeer, Snowy Plover, and Horned Larks. On wet playa, Killdeer, Horned Lark and Common Raven were seen throughout the year. A number of other bird species used wet playa areas seasonally including a variety of waterbirds. Shorebirds, gulls, and waders were observed during spring and fall migration, or as a wintering location, namely American Pipits. Table 2 shows the species reported as being associated with playa during the baseline surveys (District 1998). Of the species listed, only a few are expected to use unvegetated playa for nesting. Species that may use playa areas for nesting include Snowy Plover, American Avocet, and Killdeer. Horned Larks may nest in nearby alkali meadow habitats and forage in adjacent playa. The Snowy Plover is the only sensitive species expected to use playa habitats for nesting. Mountain Plover, a state species of special concern, may be encountered in small numbers in playa habitats at Owens Lake during the fall and winter.

Table 2. Birds Observed Associated with Playa During Baseline Surveys

Taxonomic Group	Common Name
Shorebird	American Avocet
	Black-necked Stilt
	Dowitcher sp.
	Dunlin
	Greater Yellowlegs
	Killdeer
	Least Sandpiper
	Lesser Yellowlegs
	Marbled Godwit
	Willet
	Long-billed Curlew
	Whimbrel
	Mountain Plover
	Semi-palmated Plover
	Snowy Plover
	Black-bellied Plover
	Western Sandpiper
	Spotted Sandpiper
Waterfowl	Mallard
	Snow Goose
	Unidentified Anas species
Other waterbird	California Gull
	Ring-billed Gull
	White-faced Ibis
Raptor	Peregrine Falcon
	Northern Harrier
	Prairie Falcon
	Ferruginous Hawk
	Osprey
Perching birds	Horned Lark
	Common Raven
	American Pipit
	White-throated Swift
	Violet-green Swallow

Based on baseline observations, it was concluded that the playa areas offered “little in the way of resources to mammals”. Small mammals such as pocket mice and deer mice are not expected to use open playa due to the lack of cover and food resources. Medium and large mammals may use the edges of the playa as a travel corridor but are not expected to use open playa due to a lack of resources. Only two bat species, the Spotted Bat (*Euderma maculatum*) and Yuma myotis (*Myotis yumanensis*), were detected over playa habitats. Due to the limited insect resources of playa, bats detected in playa habitats may have simply represented individuals enroute to other more productive habitats.

2.2.2. Transmontane Alkali Meadow

Many common invertebrate species were found to occur and foraging in TAM. Insects encountered in TAM include dragonflies, short-horned grasshoppers (Family Acrididae), hover flies (Family Syrphidae) and ground beetles (Family Carabidae). Based on more recent visits by LADWP staff, it is also apparent that DAM can support large numbers of ants (Family Formicidae) and spiders (Order Araneae), with occasional large outbreaks of grasshoppers (Family Acrididae). The alkali skipper (*Pseudocopaeodes eunus eunus*) is a butterfly that was found in moist and dry alkaline meadows that support its larval host plant (saltgrass) but adult alkali skipper need a nectar source. The alkali skipper occurs in a large but patchy distribution from eastern San Diego County through the Mojave Desert and Great Basin Desert north to at least Mono County (Emmel and Emmel 1973). This species has no special status, but is mentioned as being associated with DAM and other saltgrass-dominated TAM.

The TAM community supports low numbers and a low diversity of herptofauna. Species found in DAM were Zebra-tailed lizard (*Callisaurus dracanoides*), Desert Spiny lizard (*Sceloporus magister)*, and Western Whiptail *(Aspidospelis tigris)*. Side-blotched lizards *(Uta stansburiana)*, will also occur in DAM. No amphibians were noted in DAM, although some species, such as Great Basin Spadefoot toad or Western toad may seek refuge in existing burrows in DAM, depending on the landscape setting context.

The bird community associated with TAM varies considerably based on the alkali meadow subcommunity type. Saturated and moist alkali meadow sites support the greatest number of species, while DAM supports the fewest number of species of the three types of TAM. The 15 acres of TAM in the Project area for Phase 1 construction was largely found in existing spring mounds within the Project area. Species such as Savannah Sparrow and Horned Lark are species typically found in DAM.

Small mammal species found in DAM include Pocket gopher (*Thomomys bottae*), Owens Valley Vole (*Microtus californicus vallicola*), and deer mouse (*Peromyscus maniculatus*). Coyote (*Canis latrans*), kit fox (*Vulpes macrotis macrotis*), and bobcat (*Felis rufus baileyi*) may hunt in these areas. Bat species detected foraging or flying over DAM were Mexican Free-tailed bat (*Tadarida brasiliensis*), Spotted bat (*Euderma maculatum*), Pallid bat (*Antrozous pallidus*) and Yuma myotis (*Myotis yumanensis*). Tule elk (*Cervus elaphus nanodes*) may use DAM for resting and foraging, but saltgrass is low quality forage for this species.

2.2.3. Upland Scrub Communities

Insects found in scrub communities consisted of widespread and common invertebrate species. Some of the more conspicuous insects found in Shadscale Scrub included several species of grasshoppers (Family Acrididae), many species of wild bees, woodboring beetles (Families Buprestidae and Cerambycidae), and butterflies such as Painted ladies (*Vanessa cardui*), Lotta Marbles (*Euchloe hyantis lotta*), and Checkered Whites (*Pontia protodice*). Two species of local significance were found only in dune systems, which may support shadscale scrub. The two species mentioned in baseline documents are the Geometrid moth (*Tescalsia giulianiata*), a recently described species found in Owens Valley and Deep Springs Valley; and the Owens Valley Dune Weevil (*Trigonoscuta ownsi*), known only from dune areas outside the Project area. Neither species has special status.

Scrub communities were found to support more species of lizards and snakes than any other Owens Lake community. The species encountered most frequently were Western Whiptail, Zebra-tailed lizard, and Side-blotched lizard (District 2003). The Desert Spiny lizard (*Sceloporus magister*) is a good climber that has been seen in shrublands adjacent to the playa, usually in close proximity to rocks, shrubs, or other cover. Desert Horned lizards (*Phrynosoma platyrhinos*) are less common and occupy sandy upland areas with sparse vegetation. Long-nosed Leopard lizards (*Gambelia wislizenii*) uncommonly occur around shrubs adjacent to dust control areas (District 2003). There was one sighting of a Desert Iguana (*Dipsosaurus dorsalis*) on the west side of Owens Lake (District 2008), even though their preferred habitat of creosote bush scrub is lacking.

Snakes that have been captured in upland scrub, usually on or adjacent to the interstate highways around Owens Lake include Coachwhip (*Masticophis lateralis*), California Kingsnake (*Lampropeltis getulus californiae*), Gopher snake, and Sidewinder (*Crotalus cerastes cerastes*).

The dry upland Shadscale Scrub community supports species such as Sage sparrow, Loggerhead shrike, and Le Conte's thrasher. Sensitive species that may use Shadscale scrub habitats for nesting include Loggerhead shrike and Burrowing owl. The Le Conte's thrasher is also found breeding in the Shadscale scrub communities surrounding Owens Lake, and was formerly listed as a California Species of Special Concern statewide. The February 2008 revision of the CDFG special animals list clarifies that the Species of Special Concern status only applies to populations of Le Conte's thrashers in the San Joaquin Valley.

Mammal species found to occur in scrub communities include coyote (*Canis latrans*), bobcat (*Felis rufus baileyi*) and kit fox (*Vulpes macrotis macrotis*). Small mammals such as White-tailed Antelope Ground Squirrel (*Ammospermophilus leucurus leucurus*), kangaroo rats (*Dipodomys* spp.), and Pocket mice (*Perognathus* spp.) can also be found in upland scrub. The only species of bat detected in shadscale scrub was the Western pipistrelle (*Pipistrellus hersperus*). Other bat species can be expected to occur accidentally when flying to water resources for foraging or roost sites.

3.0 DUST CONTROL MEASURES

The 1997 SIP described the three Dust Control Measures (DCMs) approved by the District to control dust emissions from the Owens Lake bed: shallow flooding, managed vegetation, and gravel. The 2008 SIP allows LADWP to provisionally use a fourth DCM known as Moat and Row. It also provides for changed to shallow flood operation at less than 99% control efficiency if and where certain conditions are met. Until the 2008 SIP, the District required that the City construct and operate all DCMs to achieve 99% PM_{10} (particulate matter under 10 microns) control.

The 99% control efficiency standard resulted in performance efficiency specifications for each of the three DCM. Based on the District's research in the 1990s, this meant that all shallow flood areas had to be maintained at 75% wetted surface, managed vegetation was required to be maintained at 50% cover of live or dead vegetation (which has subsequently been reduced), and gravel surfaces required 100% coverage with a 4-inch layer of gravel. However, not all of the additional emissive areas that require control under the 2008 SIP (Supplemental Dust Controls) require 99% control efficiency to achieve the National Ambient Air Quality Standards for PM_{10} at the historic shoreline. Based on data collected between July 2002 and June 2006, air quality modeling shows that the actual required levels of PM_{10} control efficiency necessary varies from 30% to over 99%. These varying required control efficiencies reflect the fact that different areas of the lake bed have different emissions rates and that areas closer to the historic shoreline require higher control efficiencies than similar areas well away from the shoreline. All additional DCMs constructed under the provisions of the 2008 SIP will be constructed and operated to achieve the minimum dust control efficiencies (MDCEs) shown in Figure 1. Initially, DCMs constructed prior to 2007 will be required to continue to achieve 99% MDCE, except during the ramping flow periods and shoulder periods. Any reductions in control efficiency are incremental and gradual and will be reversed where and when they cause or contribute to shoreline PM_{10} violations in cooperation with the District.

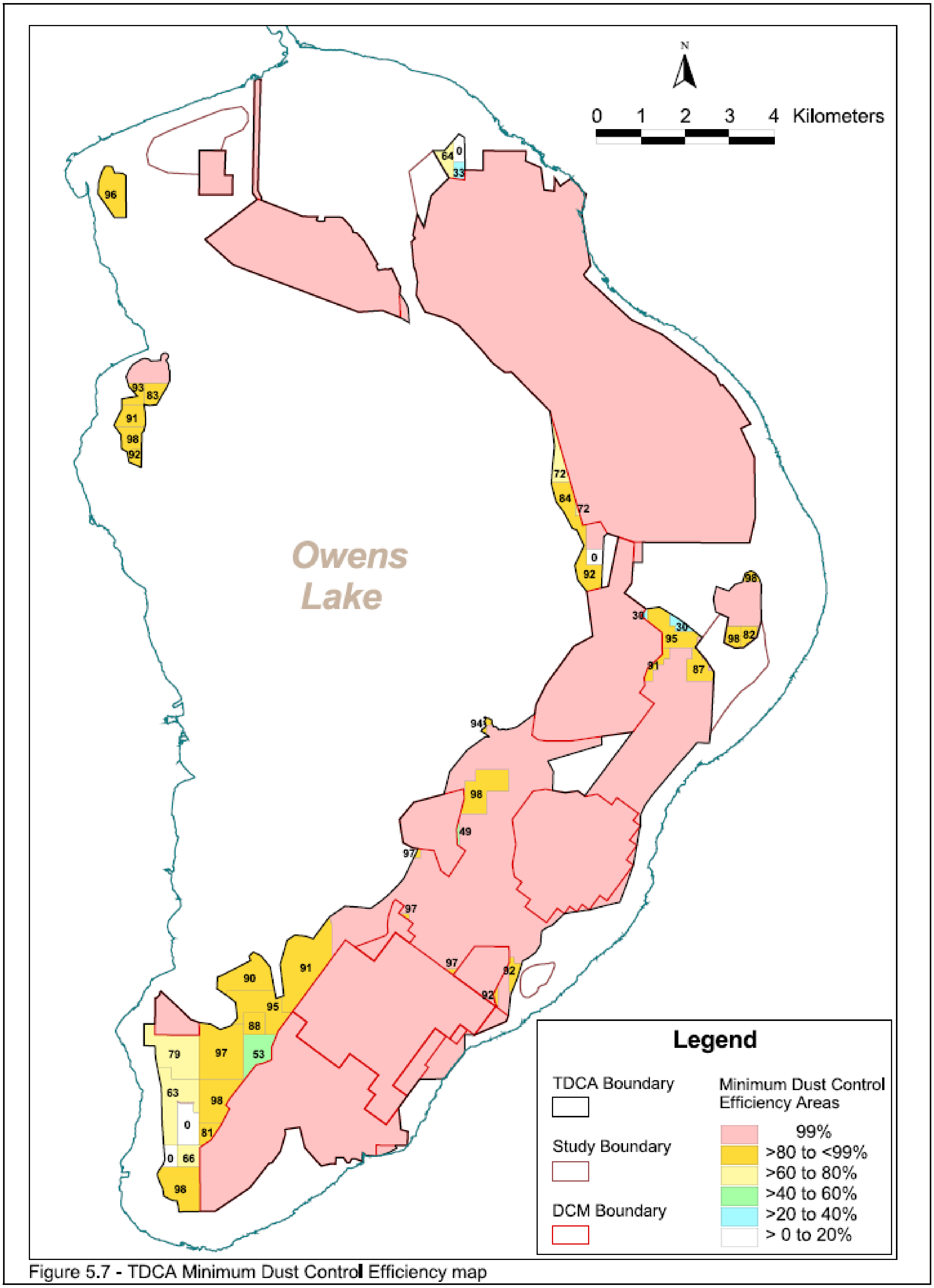


Figure 1. Minimum Dust Control Efficiency Areas

3.1. Description of Shallow Flooding

The naturally wet surfaces on the lake bed, such as seeps, springs, and the remnant brine pool are resistant to windblown dust emissions. These naturally wet areas are found where groundwater is discharged onto the lake bed or where surface water (such as water from the Owens River or Cartago Creek) flows across the lake bed surface. The aerial extent of wetting depends mainly upon the amount of water present on the surface, evaporation rate and lake bed topography. The size of the wetted area is less dependent on soil type because, once the water table is raised to the playa surface; surface evaporation is independent of soil-type.

The shallow flooding DCM mimics the physical processes that occur at and around natural springs and wetlands. Shallow flooding can provide dust control over large areas with minimal infrastructure. The goal of shallow flooding is to provide dust control by maintaining intermittent areas with sufficiently wet surfaces.

Two methods of shallow flooding have been employed by the City on the lake bed since the first DCMs began operation in 2001. The first, known as sheet flooding or lateral shallow flooding, consists of releasing water from arrays of low-flow water outlets called risers. This arrayed configuration of water delivery creates large, very shallow sheets of braided water channels. Water depths in sheet flooded areas are typically at most just a few inches deep. The lower edges of sheet flooded areas have containment berms to capture and pond excess flows. These ponds are referred to as tailwater ponds. The water slowly flows across the typically very flat lake bed surfaces, downhill to tailwater ponds where pumps have the ability to recirculate the water back to the laterals and in some areas can be pumped to other ponds or into a brine line so water can be reused elsewhere. Figure 2 shows a typical sheet flooding cell and riser.

Figure 2. Sheet Flooding Cell and Riser

Figure 3. Pond Shallow Flooding Area

The second method of shallow flooding employed by the City is known as pond shallow flooding. Pond areas have water containment berms that allow ponds to be formed that submerge the emissive lake bed areas. These ponds are typically deeper than sheet-flooded areas, averaging approximately 1-foot deep, but can be up to four feet deep on rare occasions. Figure 3 shows a typical pond shallow flooding area from a containment berm.

Other infrastructure associated with the Shallow Flood DCM includes raised berms, roadways, pumps, spillways, control panels, valves, equipment pads and their associated sloped shoulders. In some cases the shoulders are rock-faced to protect them from wave erosion. Well-traveled roads are typically covered with gravel; less-traveled roads and berms are native soil that is sometimes capped with shale or other rock. Roads and berms are maintained to control emissions by watering or other means as necessary.

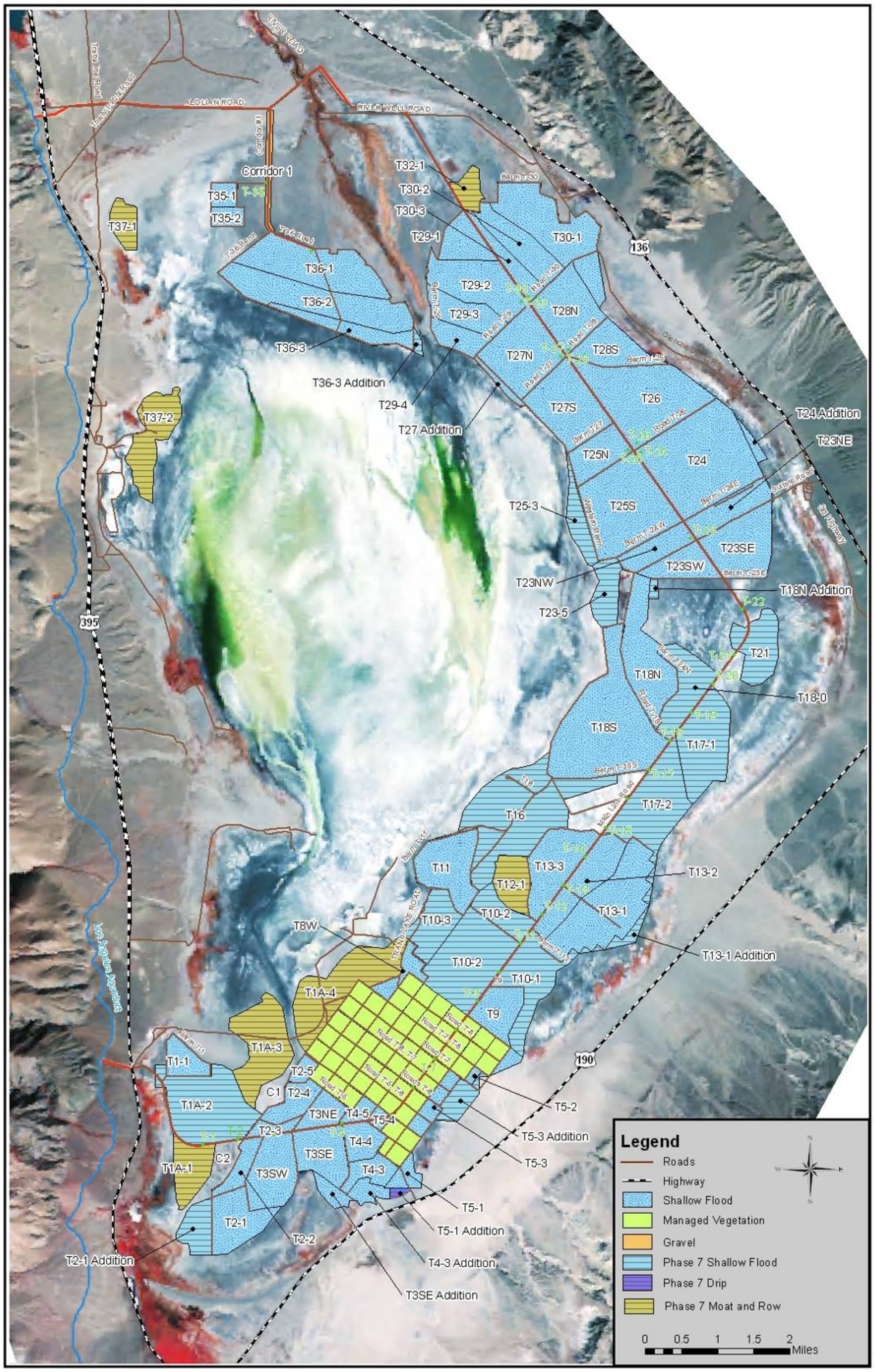


Figure 4. Location of Shallow Flood Cells on Owens Lake

Shallow flooding DCM has been implemented in several phases. Dust control areas are identified by turnout using alphanumeric designations ranging from T1 (south) to T36 (north).

Turnouts were developed for dust control areas in the following order:

Phase 1 North: T23-T30, formerly Zone 2 (2002),
Phase 1 North: T35 and T36, formerly Zone 1 (2003),
Phase 1 South: T4 (2003),
Phase 2 T3 (2003), and
Phase 4 T8, T9, T11, T24 Addition, and T18 (2004).

During Phase 5 a portion of Phase 1 construction was improved including Zone 1 (T35 and T36) and the north portion of Zone 2 (T30 and T29). Other DCA cells that were constructed during Phase 5 are included in Table 3. Phase 7 DCA cells are due to be completed by 2010. Refer to Figure 4 for the geographic location of each cell.

Table 3. Phase V and VII Shallow Flood Cells

PHASE V DCM CELL	YEAR OPERATIONAL	PHASE VII DCM CELL	YEAR OPERATIONAL*
T1-1	2006	T10-1	2010
T13-1	2006	T10-2	2010
T13-2	2006	T12-1	2010
T13-3	2006	T13-1 Addition	2010
T2-1	2006	T16	2010
T2-2	2006	T17-1	2010
T2-3	2006	T17-2	2010
T2-4	2006	T18N Addition	2010
T2-5	2006	T19	2010
T27 Addition	2006	T1A-1	2010
T29-1	2006	T1A-2	2010
T29-2	2006	T1A-3	2010
T29-3	2006	T1A-4	2010
T29-4	2006	T21	2010
T30-1	2006	T2-1 Addition	2010
T30-2	2006	T23-5	2010
T30-3	2006	T25-3	2010
T35-1	2006	T32-1	2010
T35-2	2006	T36-3 Addition	2010
T36-1	2006	T37-1	2010
T36-2	2006	T37-2	2010
T36-3	2006	T5-1 Addition	2010
T3SE Addition	2006	T5-3 Addition	2010
T4-3 Addition	2006		
T5-1	2006		
T5-2	2006		
T5-3	2006		
T5-4	2006		

* Currently being constructed therefore year scheduled to become operational.

3.1.1. System Design

Water is conveyed through a trunkline (zonal mainline) connected to the Los Angeles Aqueduct (LAA) at each end of Owens Lake. The northern connection point is the Lubken Spillgate and the southern connection point is the Cartago Spillgate. During Phase 3 of construction, the trunkline was connected to complete a continuous pipeline served from the two spillgates. It now spans 31.8 miles and transects the full length of Owens Lake. During Phase 5, the LORP Pumpback Station was completed. The LORP Pumpback Station is connected to the zonal mainline that supplies Owens Lake. The Pumpback Station pumps a maximum of 50 cfs which either supplies Owens Lake or is pumped back in to the LAA (depending on Owens Lake water demand).

Owens Lake shallow flood turnouts supply ponds, lateral shallow flooding, or both. Lateral shallow flooding facilities include valve stations, irrigation submain pipelines, lateral pipelines, irrigation risers, subdrain pump stations (sometimes), tailwater pump stations (sometimes), and perimeter berms/roadways. Pond shallow flooding facilities include submain pipelines, outfalls, perimeter subdrain pump stations (sometimes), and perimeter berms/roadways. Water is delivered to each DCM through submain pipelines and/or irrigation laterals. The laterals are evenly spaced in lateral shallow flood areas at roughly 500- to 800-foot intervals (perpendicular to slope). Each lateral shallow flood area contains multiple lateral pipelines. Irrigation risers with bubbler heads (alfalfa valves) are spaced at 60 to 100 feet, along laterals. The risers extend 12 to 24 inches vertically above the surrounding grade. Tailwater runoff (overland flow) is captured in ponds at the down gradient areas of lateral shallow flood areas. Tailwater pumps recirculate this water in all DCMs designed in Phase 1, 2, and 4. Only one tailwater pump was installed during Phase 5 (T5 Shallow Flood). All other Phase 5 areas were designed with shallow flood at the up-gradient end and a cascading series of large ponds down gradient that capture all tailwater.

Pond shallow flood areas are usually supplied through one large water inlet or submain outfall although they may also collect sheet flow from lateral shallow flood areas that are up gradient. Water is delivered to pond areas until their extent and depth are sufficient to submerge the required percentage of the DCM. Operations personnel manage the ponds within a range of target levels. The containment berms are armored with rip rap (rock) to protect them from wave erosion. Occasionally containment berms only have rocks installed up to the high-water level as opposed to the top of the berm. Rip rap will be installed to the top of all containment berms constructed during Phase 7.

3.1.2. Operations

Based on operation of shallow flood DCMs in 2007 and 2008, approximately 3.9- to 3.78-acre-feet per acre, respectively were supplied to lateral shallow flood and pond shallow flood areas. It is anticipated that after April 1, 2010 the annual amount of water needed for each acre of shallow flood DCM will be reduced as a result of relaxing the wetness cover requirements during the fall and the spring ramping flow periods. Various other water conservation practices, discussed later in this document, may add to the water use efficiency for shallow flooding on Owens Lake.

Table 4. Acreage and Type of Shallow Flood Cells

SHEET FLOW CELLS		PONDED CELLS	
Area Name	**Acreage**	**Area Name**	**Acreage**
T10-1	444	T10-2	882
T13-1	746	T10-3	281
T13-1 Addition	80	T11	432
T17-2	350	T1-1	156
T1A-2	693	T13-2	391
T2-1	334	T13-3	447
T2-1 Addition	186	T16	1074
T21E	274	T17-1	777
T23SE	475	T18N	545
T24	1087	T18N Addition	21
T24 Addition	42	T18S	1166
T25-3	167	T18-0	335
T25N	260	T21W	40
T25S	820	T2-2	133
T26	853	T2-3	75
T27N	549	T23-5	199
T27S	545	T23NE	264
T28N	454	T23NW	217
T28S	300	T23SW	227
T30-1	692	T2-4	181
T36-1	646	T2-5	66
T3SE	314	T27 Addition	50
T3SE Addition	77	T29-1	220
T3SW	389	T29-2	479
T4-3	152	T29-3	258
T4-3 Addition	88	T29-4	163
T5-1	87	T30-2	317
T5-2	20	T30-3	173
T5-3	141	T35-1	79
		T35-2	85
		T36-2	669
		T36-3	226
		T3NE	151
		T4-4	166
		T4-5	70
		T5-3 Addition	137
		T5-4	40
		T8W	133
		T9	293

During Phase 1, only minimal grading was conducted in the lateral shallow flood areas. Compliance required extensive manual labor and the construction of berms built by hand as well as equipment. Subsequent to installation, berms were constructed in the Phase I areas including 2-foot berms on one-foot contour lines and cultivation of 6-inch furrows perpendicular to contour berms where soil conditions allowed.

Phase 2 South, Phase 4, Phase 5, and Phase 7 lateral shallow flood areas were all mass graded with land leveling equipment to facilitate water spreading. Soil conditions did not allow grading to the specifications in some areas.

Phase 1 and Phase 2 shallow flood was constructed with tailwater pumps to recirculate runoff water back to the laterals. These DCMs were designed to operate as lateral shallow flood areas with only a small tailwater pond on the down-slope containment berm. This reduces the flexibility of operation because irrigation must be decreased when the ponds become too full. The operation of this earlier sheet flow design requires significant on-the-ground effort to ensure that water is distributed to maintain compliance.

Phase 5 DCAs were constructed with lessons learned from earlier phases of construction for better operation. These DCM cells are generally smaller and have less slope within each cell because they are terraced with sheet flow shallow flood in higher elevation areas cascading to lower elevation ponds. Phase 5 shallow flood has only one tailwater pump at T5-3. Perimeter subdrain pumps also apply water to T35-2, T36-3, and T29-2. All other Phase 5 areas are irrigated solely with freshwater from the mainline. In order to accommodate the water flowing from above, ponds were designed with sufficient area to equal or exceed tailwater inflow from the lateral shallow flood areas. This method of shallow flood requires more water due to the increased surface area for evaporation of ponded water but is much less labor-intensive.

Phase 7 also utilizes the lateral shallow flood/cascading ponds design in many areas. There are also numerous shallow flood ponds (no laterals), and one new tailwater pump to be installed at T2-4 and tied into the brine line at T4. Some low control efficiency areas such as T25-3 are bound only by very small earthen berms (no rip rap). The T5-1 addition will be a drip irrigation system designed to encourage recruitment of desert vegetation.

3.1.3. Maintenance

All areas may be graded with heavy equipment during normal operation to limit channeling of water from adjacent bubbler lines. This makes it easier to wet a larger proportion of the surface with a given flow.

In steeper areas this may involve the construction of parallel berms down gradient from individual bubblers. The slope of these areas has to be such that the gradient is enough for water to flow but not such that it causes increased velocity/erosion and channeling hindering water spreading. This construction will be site-specific as different soil types have different infiltration rates and saturation points and since slope vary across the site.

In some areas wetness may also be more easily achieved by doing earthwork (with heavy equipment) that creates a network of wet and dry areas to meet the desired wetness distribution requirements.

Whiplines are 2-inch flexible surface pipes installed to get water to dry areas that are not accessible to heavy equipment. They are connected directly to risers, their ends are capped, and ¼-inch holes are drilled at desired intervals for better wetness distribution. Although they effectively irrigate high, dry areas the holes in the lines plug with debris and they have a higher water demand because they require more pressure.

Sprinklers may be connected to whipline pipe or to separate piping systems. Their purpose is similar to whiplines. Like whiplines, sprinklers are also used when areas are inaccessible to equipment. The key difference is that sprinklers use less water than the existing lateral/bubbler irrigation system and they can run on the same pressure. Sprinklers are also easier to unplug than whiplines. Many of the existing whiplines in the field have the potential to be retrofitted using sprinklers.

3.2. Site Water Application

During the dust control season of October 1 through June 30 each year, on shallow flood DCMs, dust will be controlled through water application. The amount of flooding required during the spring and fall shoulder seasons (discussed in following subsections) may be decreased and as more information is obtained. Habitat maintenance flows for Snowy Plover will occur in some locations between July 1 and July 21 (discussed in Section 6). Changes to the amount, timing, and location of water application to a site may occur but will continue to be consistent with the requirements for dust control.

3.2.1. Spring Shoulder Season — May 16 through June 30

Under the provisions of the 2003 SIP, the City is required to have shallow flooding DCM areas fully wetted and operational through the end of the dust season on June 30 of every year, except for habitat maintenance flows that may extend to July 21. However, based on data collected during the period from July 2002 through June 2006, the MDCEs are lower during the late spring than they are during the winter and early spring. This is due to the formation of durable, less emissive summer salt crusts on the surface of the lake bed. Late spring is also a time when temperatures in the Owens Valley begin to increase. The 21-year (1985 through 2005) average temperature for Keeler in March is 54°F—it rises 24° to 78°F for June. Higher air temperatures and more solar radiation mean that more of the water applied to DCM areas is lost to evaporation. Therefore due to the facts that a) the lake bed is naturally less emissive in late spring than during the winter and b) due to increasing temperatures more water must be applied to wet the same amount of area, in order to conserve water resources, starting after April 1, 2010, areas requiring 99% MDCE will have the following wetness requirements:

- From October 16 of every year through May 15 of the next year, shallow flooding areas with 99% MDCE shall have a minimum of 75% aerial wetness cover.
- From May 16 through May 31, shallow flooding areas with 99% MDCE shall have a minimum of 70% aerial wetness cover.
- From June 1 through June 15, shallow flooding areas with 99% MDCE shall have a minimum of 65 percent aerial wetness cover.
- From June 16 through June 30, shallow flooding areas with 99% MDCE shall have a minimum of 60% aerial wetness cover.

If any of the shallow flooding areas that are allowed to have reduced wetness during the spring shoulder season fail to meet even the reduced wetness requirements, it is possible that the areas failed to meet their minimum targets because not enough water could be delivered through the water distribution infrastructure. Therefore, if the LADWP fails to meet the spring shoulder season targets that start on May 16 and there were no monitored or modeled exceedances of the federal standard at the historic shoreline, those areas that did not meet the reduced minimums will be deemed to be in compliance, if the City demonstrates in writing and the District reasonably determines in writing that maximum water delivery mainline flows were maintained throughout the applicable period.

3.2.2. Fall Shoulder Season — October 1 through October 15

Under the provisions of the 2003 SIP, the City is required to have shallow flooding DCM areas fully wetted and operational at the start of the dust season on October 1 of every year. However, in order to get the shallow flooding areas sufficiently wet by October 1, water deliveries actually start in late August. This means that some level of dust control is being provided outside the dust control season as the DCM areas "wet up." Based on data collected during the period from July 2002 through June 2006, as well as the District staff's experience over more than two decades on the lake bed, the first two weeks of October are not a period when the lake bed typically experiences highly emissive conditions. Therefore, to conserve water resources, full levels of dust control will not be required until October 16 of each year. From an operational standpoint, however, gradually increasing levels of dust protection will occur starting in early September as water deliveries begin. These protection levels will ramp up as additional water is delivered, until full levels of protection are provided on October 16. The October shoulder season adjustments will go into effect in October 2010.

3.2.3. Lateral Shallow Flood Areas

The water application to Phase 1 and Phase 2 is provided in a recirculation system, with fresh water added to compensate for evaporative and infiltration losses. DCAs are irrigated to achieve wetness requirements. Only fully saturated playa soils or ponded water is considered "wet."

During the first two years of operations (2002-2004) general site water application of risers or bubblers were usually between 12 and 18 gallons per minute (gpm); however, 4 laterals (top laterals in their respective areas) were designed with flow rates per riser of 6, 8, and 11 gpm. Maximum flow rate is close to 20 gpm per riser. In-field modifications to piping, including installation of flexible surface pipe to get water to isolated high spots and various valve adjustments may have changed actual flow rates somewhat from design flows to adjust to site specific requirements such as surface salt crust formation, and lack of soil surface saturation. During normal shallow flooding operations, between 40% and 80% of laterals and risers were in use at any given time, with operators continuously rotating between laterals every 4 to 12 hours. The minimum amount of time per lateral per day is between 2 to 4 hours.

Phases 5 and 7 sheet flow areas will operate similarly but these areas typically are not equipped to recirculate water from tailwater ponds to the bubbler laterals. Instead of being recirculated, the brine water from sheet flow areas is allowed to pond in down-gradient cells.

Currently lateral operation is automated through Supervisory Control and Data Acquisition (SCADA). Application rates are site specific due to variations in infiltration rates and changes in water flow patterns and saturation percentages. These application rates are seasonally adjusted based on evaporation demands and other dust control needs

Occasionally whiplines are used for problem areas (discussed previously). Whiplines are effective in wetting high, dry areas, but use more water and plug frequently.

Sprinklers can also be used to irrigate high, dry areas. Sprinklers apply less water than the traditional shallow flooding system and whiplines

3.2.4. Pond Shallow Flood Areas

Water is delivered to a given pond DCA cell until the pond reaches a size and depth sufficient to submerge the required amount of DCM area.

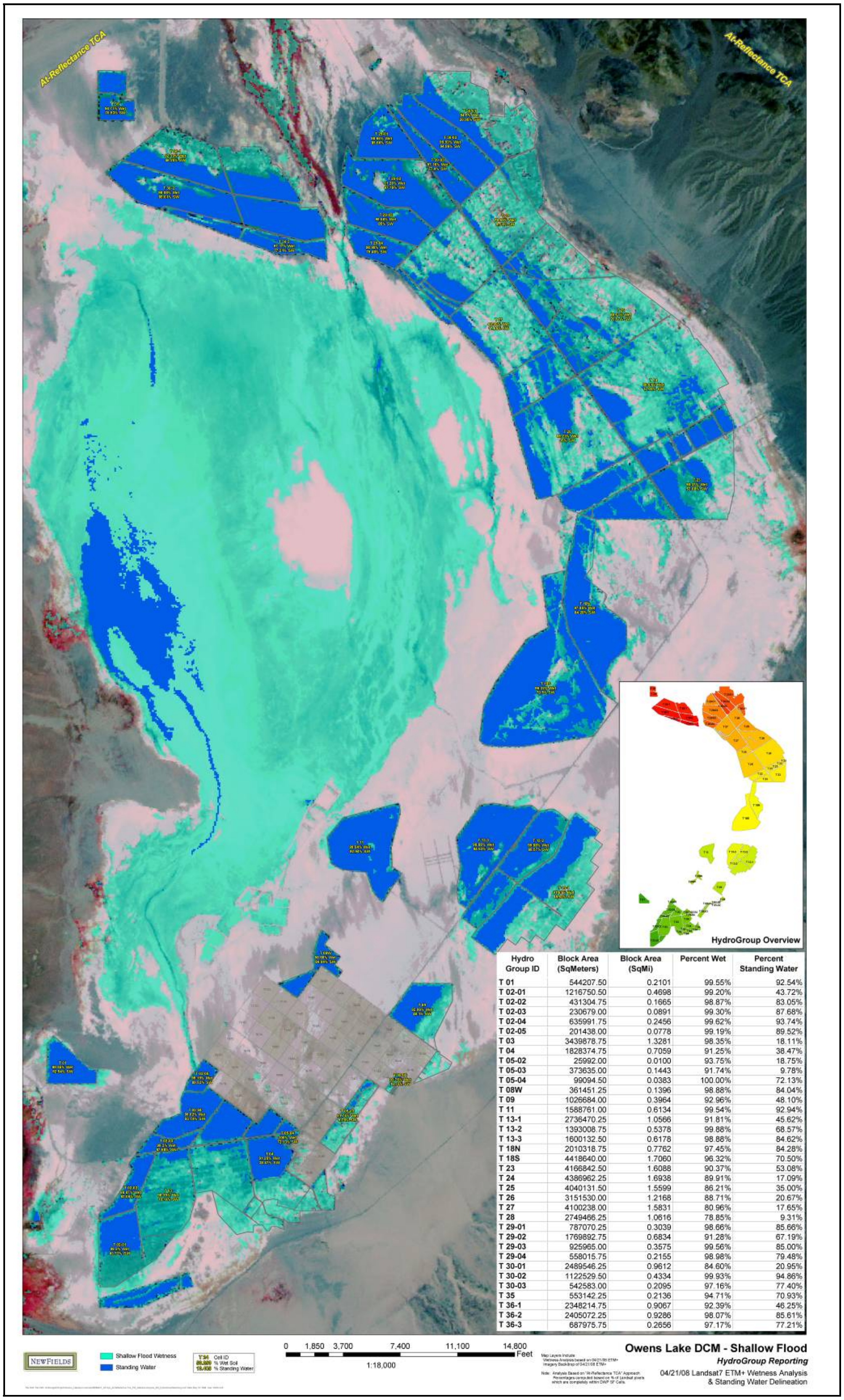
Most ponds must be filled early in the spring before the lateral shallow flood demand approaches the capacity of the main pipeline. During peak demand mainline capacity is only sufficient to supply the lateral shallow flood, so ponds must be adequately filled to stay compliant during the hottest months. It is not possible to fill ponds and operate shallow flood simultaneously, particularly in the mid-summer months when evaporation is high.

The filling of ponds above what is needed for dust control gives the flexibility to store water for compliance in the ponds when there is capacity in the mainline, and then devote the needed capacity to keep lateral/sheet flow shallow flood areas in compliance when water loss to evaporation is high. Ponds need to be filled again after mid-summer, when evaporation has decreased enough so that the capacity of the main pipeline is not utilized by sheet flow alone. This operation of ponds described above results in evaporative loss due to increased surface area of standing water. Water use is greater due to large wetted areas over a longer period.

3.3. Resulting Site Conditions

3.3.1. Lateral Shallow Flood Areas

Site water application and operations result in a mosaic of shallow-ponds (1 to 6 inches deep), saturated soil surfaces, unsaturated areas, and ponding (1 to 2 feet deep). The percent wetted surface is assessed throughout the season using satellite imagery. This imagery provides a two-dimensional representation of the location of standing water and saturated surfaces. Figure 5 provides an example of one of these color infrared (CIR) aerial images showing typical wetness conditions on Owens Lake during the dust control season. The extent of ponded water or saturated soil within each DCM is shown.



Hydro Group ID	Block Area (SqMeters)	Block Area (SqMi)	Percent Wet	Percent Standing Water
T 01	544207.50	0.2101	99.55%	92.54%
T 02-01	1216750.50	0.4698	99.20%	43.72%
T 02-02	431304.75	0.1665	98.87%	83.05%
T 02-03	230679.00	0.0891	99.30%	87.68%
T 02-04	635991.75	0.2456	99.62%	93.74%
T 02-05	201438.00	0.0778	99.19%	89.52%
T 03	3439878.75	1.3281	98.35%	18.11%
T 04	1828374.75	0.7059	91.25%	38.47%
T 05-02	25992.00	0.0100	93.75%	18.75%
T 05-03	373635.00	0.1443	91.74%	9.78%
T 05-04	99094.50	0.0383	100.00%	72.13%
T 08W	361451.25	0.1396	98.88%	84.04%
T 09	1026684.00	0.3964	92.96%	48.10%
T 11	1588761.00	0.6134	99.54%	92.94%
T 13-1	2736470.25	1.0566	91.81%	45.62%
T 13-2	1393008.75	0.5378	99.88%	68.57%
T 13-3	1600132.50	0.6178	98.88%	84.62%
T 18N	2010318.75	0.7762	97.45%	84.28%
T 18S	4418640.00	1.7060	96.32%	70.50%
T 23	4166842.50	1.6088	90.37%	53.08%
T 24	4386962.25	1.6938	89.91%	17.09%
T 25	4040131.50	1.5599	86.21%	35.00%
T 26	3151530.00	1.2168	88.71%	20.67%
T 27	4100238.00	1.5831	80.96%	17.65%
T 28	2749466.25	1.0616	78.85%	9.31%
T 29-01	787070.25	0.3039	98.66%	85.66%
T 29-02	1769892.75	0.6834	91.28%	67.19%
T 29-03	925965.00	0.3575	99.56%	85.00%
T 29-04	558015.75	0.2155	98.98%	79.48%
T 30-01	2489546.25	0.9612	84.60%	20.95%
T 30-02	1122529.50	0.4334	99.93%	94.86%
T 30-03	542583.00	0.2095	97.16%	77.40%
T 35	553142.25	0.2136	94.71%	70.93%
T 36-1	2348214.75	0.9067	92.39%	46.25%
T 36-2	2405072.25	0.9286	98.07%	85.61%
T 36-3	687975.75	0.2656	97.17%	77.21%

Figure 5. Owens Lake DCM Shallow Flood Wetness

Lateral shallow flood areas from Phase 1 are more variable in the diversity of habitat structure they provide simply because the topography is more variable. This variation in topography occurs both naturally (most areas were not graded) and due to berming and leveling activities conducted to achieve and maintain wetted area compliance.

Wetness distribution is limited by sandy substrates and/or extensive channeling (T28 and T26) and high spots from previous land use activities that prevent inundation (T25). In addition, clay substrates (T23) result in extensive ponding.

Aside from T5-3, Phase 5 lateral shallow flood areas do not normally have bermed areas with ponded water. Typically, the lateral shallow flood tailwater flows directly to the series of cascading ponds.

Phase 7 sheet flow areas are currently being constructed as of the writing of this plan. They will be operated similar to Phase 5 lateral shallow flooding areas.

3.3.2. Pond Shallow Flood Areas

Most pond shallow flood cells were built during Phase 4 through Phase 7 construction, with the exception of T4-4 and T4-5. Shallow flood pond areas may collect water from sheet flow areas or (more often) be filled with freshwater directly from mainline. The result is an area composed of ponded water with occasional islands depending on topography. Up-gradient edges typically consist of relatively shallow water with some areas adjacent to down-slope containment berms being a few feet deep.

The amount of exposed playa may vary depending on the pond water level. Island or shore that are exposed within a cell must be "substantially equally distributed" to reduce fetch length and maintain dust control.

3.3.3. Brine Line Operation

The brine line operates between turnouts T2 and T25. Its main function is to provide brine for managed vegetation. As discussed below, irrigation of managed vegetation consists of blending freshwater from mainline with brine to achieve an electrical conductivity of approximately 9 mS/cm. The majority of brine for managed vegetation is supplied from the T4-4 pond or the drain management units (DMUs) that pump water from managed vegetation drain tiles. Currently the salinity of T4-4 (which supplies the brine line) has been decreasing to a point that it is hampering the ability to meet the irrigation conductivity target for managed vegetation. With additional construction of a tailwater pump at T2-4, brine will be available from more saline DCA cells after Phase 7.

Brine blows off into the T4-4 and T4-5 ponds whenever high pressure is sustained. During the winter, brine blows off into T4. The brine line also supplies various laterals. If the T4 pond becomes too full, water is sometimes sent to T11, T13 or T18 through the T9 manifold. When operating managed vegetation, brine is conserved for the managed vegetation as much as possible.

3.4. Salt Management

The amount of brine from sheet flow areas recirculated back to the upper bubblers will be limited as much as possible. Based on past experience, this recirculation of brine results in salt deposition on the surface that can hamper compliance under current SIP rules that tend to penalize LADWP for areas where salt crust forms. This brine will usually be moved to down gradient ponds for reuse. This may result in increases in salt accumulation in ponds with the lowest elevation. This increase in salinity reduces evaporation rates.

Phase 7 shallow flood areas have yet to be built, let alone operated, therefore it is not possible to predict how quickly salts will accumulate. The amount of brine water that flows down gradient to low-elevation ponds will vary seasonally and yearly. Two of these ponds are large (over 1000 acres each) and will be filled with a large amount of freshwater that will dilute the brine water. Therefore the rate of accumulation of salts in these ponds is unknown. Water quality and ecological toxicity monitoring will continue as required by permits in order to observe any impacts to wildlife

There is seasonal variability in salinity depending on evaporation rate. The time of year with highest salinity is the non-dust season. At this time water delivery ceases and salinity increases due to evaporation.

3.5. Vegetation Development

Some shallow flood areas that receive freshwater have already seen the establishment of various wetland plants including: cattails (*Typha* sp), sedges (*Carex* spp.), bulrush (*Scirpus* spp. and *Schoenoplectus* spp.), spikerush (*Eelocharis* spp.), rush (*Juncus* spp.), borax weed (*Nitrophila occidentalis*), Yerba Mansa (*Anemopsis californica*) as well as occasional woody species including willows (*Salix* spp.) and Fremont cottonwood (*Populus fremontii*). This increase in vegetative cover protects the playa. Native vegetation on Owens Lake will be encouraged to grow and become established where feasible. These areas will typically be in locations closer to the historical shoreline where salinity is lower, but any location in proximity to a freshwater source may provide available habitat for recruitment. Non-native invasive plants will be removed in accordance with the Noxious Weed Control Program.

Vegetation enhancement may consist of preparing sheet flow areas with grading that encourages even distribution of water and provides more suitable habitat for vegetation recruitment. Range drill seeding or hand planting of native salt tolerant wetland plants may also occur. Once vegetation establishes in areas conducive to germination eventually produce seed. This will provide a seed source for continued recruitment. On site recruitment of native vegetation has already occurred in proximity to the 40 acres of created wetlands in T30-1 and in a few other areas. Vegetation in both T30-1 and Swansea ponds area has been dispersing seed into other adjacent shallow flood areas and increasing vegetation within shallow flood DCAs.

3.6. Alternative Water Sources

The Owens Lake Groundwater Evaluation Project (OLGEP) is currently underway to evaluate the amount and location of groundwater that may be used to supply shallow flooding DCAs. Water that supplies shallow flood is currently delivered from the LAA with a small component from the LORP.

3.7. System Maintenance and Repairs

Planned system shutdowns, maintenance, and repairs will be conducted during the non-nesting season for Snowy Plover when feasible. When not feasible, repair and maintenance activities will be subject to restrictions regarding work in shallow flood cells, as described in the 2008 Lakebed Alteration Permit issued by CDFG and the 2008 SIP FSEIR, and described Section 6. Emergency repairs and modifications are exempt from certain resource protection measures (also described in Section 6).

3.8. Shallow Flood Refinement and Testing

In addition to the spring and fall ramping periods discussed in Section 3.2, LADWP has options to further refine and reduce wetness requirements discussed in the 2005 Settlement Agreement between the District and LADWP. These refinements are summarized below.

LADWP may conduct field testing to refine the needed wetness cover required to meet control efficiency requirements. This shallow flood cover test area would encompass up to 1.5 square miles and be approved by the District. This test may include variables other than wetness that help meet dust control efficiency requirements in shallow flood.

When the District reasonably determines that the approximately 43 square miles of implemented DCMs have been operational for one year with no exceedance of the federal standard at monitors located at or above the historic shoreline caused solely by sources within DCMs LADWP may decrease the wetness cover by an average of 10% over shallow flood areas requiring 99% control efficiency.

3.9. Designated Use Shallow Flood DCA Operations

This habitat in T23 consists of 4 separate dust control cells (T23NE, SE, NW, and SW), and amounts to 1183 acres and will be referred to as the Designated Habitat. T23 was fully constructed and operational in 2002. An additional 145 acres of shallow flood area in T4-3 will be managed as shorebird foraging habitat.

3.9.1. Designated Habitat of 1000 Acres for Shorebird and Snowy Plover

Facility Development

Submains for lateral shallow flood areas T23E and T23W run along Sulfate Road, which divides the blocks; however, culverts beneath Sulfate Road provide hydrologic and operational continuity between the blocks across Sulfate Road. Laterals extend from Sulfate Road into the irrigation blocks.

Water Application

Between October 1 and June 30, water is applied to T23 using automated schedules to meet the evaporative demand and maintain wetness compliance. For the first three weeks of July, a gradual dry down is implemented for nesting snowy plovers according to the 2008 SIP and CSLC Lease. T23 dries down naturally from July 21-September 1. Normal shallow flood operations start up again in early September to meet compliance by October 1.

There are many areas within T23 that have considerable ponding for much of the year. T23NE and T23NW have the most ponding. The upper portions of T23SW and T23SE still operate as lateral shallow flood, but the lower portions are ponded.

Brine Discharge

Infrastructure is currently in place to dispose of excess brine from the managed vegetation to T23-T28. As currently operated brine is rarely if ever transport brine water from managed vegetation to Zone 2 (T23-T28).

Ongoing Operations

Maintenance, such as increased land leveling and berm building will continue so that shallow flood compliance and water conservation goals are met.

3.9.2. Shorebird Foraging Habitat (T4-3)

Facility Development

Water is supplied to shallow flood cell T4-3 by lateral lines (sheet flow). The surface water applied drains into a large pond at T4-4 and T4-5 (interconnected). This area is surrounded by other areas of sheet flow shallow flood and managed vegetation.

Water Application

The T4 pumps recycle most of the T4-3 irrigation water. Freshwater is supplemented if pressure drops below its set point. When evaporation is high or water is being exported out of the T4-4 and T4-5 ponds for use in managed vegetation, freshwater is supplemented. Brine water from the brine line blows off into the T4-4 and T4-5 pond when high pressure is sustained. Brine water blows off into T4 from various DMUs and the T4 pumps. The brine line is also used to supply T4-3 and T3 laterals. If the T4 pond becomes too full, water is sometimes sent to other turnouts (T9, T2, T11, T13, and T18).

Ongoing Operations

Maintenance activities such as land leveling and berm building will continue so that shallow flood compliance and water conservation goals are met. Due to poor soil conditions, equipment cannot access many parts of T4. As a result, whiplines and sprinklers will be used where necessary to maintain compliance.

3.10. Description of Managed Vegetation

Vegetated surfaces are resistant to soil movement and thus vegetation controls PM_{10} emissions. Vegetation provides a very effective barrier that slow ground surface wind speeds below the threshold velocity for emissions. Vegetation has naturally become established where salty playa soils have become leached of salts. Natural saltgrass meadows around the playa margins and the scattered spring mounds found on the playa are examples of such areas. Observation of these naturally vegetated areas has shown that very little dust emissions are generated from them. The managed vegetation strategy is modeled on these naturally vegetated areas.

Dust control using managed vegetation is a mosaic of irrigated fields provided with subsurface drainage that creates soil conditions suitable for plant growth. A ground-level view of existing managed vegetation PM_{10} controls are shown in Figure 6. The saline soil was first reclaimed with the application of relatively fresh water, and then planted with salt-tolerant plants that are native to the Owens Lake basin. Thereafter, soil fertility and moisture inputs have been managed to encourage plant development and maintenance of appropriate cover. Existing managed vegetation controls on the lake bed are irrigated with buried drip irrigation tubing. A network of buried tile drains capture excess water for reuse on the managed vegetation area or in shallow flooding areas.

Figure 6. Ground-Level View of Existing Managed Vegetation

Managed vegetation is sustainable at Owens Lake only if salt from the naturally occurring shallow groundwater is prevented from rising back into the rooting zone. Leaching and irrigation water applied to the managed vegetation serves to leach salts down and away from the rooting zone of the vegetation. Depending on local site conditions and compliance requirements, alternative irrigation and drainage configurations, water supply quality, irrigation scheduling regimes, and plant communities may be employed, so long as the essential ground coverage requirements for managed vegetation are achieved.

The clay soils found on many areas of the lake bed are appropriate for the construction of earthen infrastructure. The native profiles, texture and fractured structure of the clay soil makes it well suited for water distribution and drainage. The lower profiles in clay soils often include a network of existing fractures, facilitating effective drain water collection and natural drainage so that the groundwater does not intrude into the rooting zone. In clay dominated soils irrigation with low-salinity or fresh water can potentially cause a collapse of the soil structure, preventing water infiltration and salt leaching.

3.10.1. Operation and Maintenance

The operational goal of managed vegetation is to maintain adequate vegetative cover to control dust emissions while minimizing irrigation water use.

Operations and maintenance of managed vegetation includes the following activities:

- operation of the irrigation and drainage systems,
- routine and special maintenance, and
- noxious weed removal.

The irrigation system is mostly automated based on a weekly irrigation schedule. Automated operations primarily include flow and pressure control; freshwater and drainwater blending; and filtration and fertigation (application of fertilizer to the irrigation water). Irrigation scheduling is primarily constrained by areas that exhibit poor drainage. Since 2004, irrigation monitoring and scheduling has been conducted for each block based on balancing soil moisture conditions and poorly drained areas within each block. Annual irrigation for the managed vegetation blocks generally ranges from approximately 8 to 24 inches.

The managed vegetation site irrigation has a target salinity of approximately 9 dS/m, therefore requires addition of saline water from the brine line. Drains installed near naturally occurring wetlands are operated to avoid significant groundwater drawdown or loss of surface water extent in the adjacent wetland areas. The amount of fertilizer added to the irrigation water is generally the minimum needed to support plant growth, with rates that are very low relative to agricultural (e.g. pasture) rates. Application rates are continuing to be optimized based on the results of onsite experiments.

Although the irrigation system is mostly automated, system components such as filtration require regular inspection. At the beginning of each irrigation season, all mechanical components of the system are checked and serviced according to the manufacturer's specifications. Filtration stations are checked regularly and maintained when needed. Areas are visually surveyed regularly for signs of irrigation leaks or plugging and repaired as needed. Other regular maintenance activities include system flushing, drain pump maintenance, and road watering. At the end of each irrigation season, the system is prepared for winter conditions (e.g. cleaned and drained).

Routine maintenance also includes implementation of measures to prevent the creation of potential mosquito-breeding habitat within the Project site. Measures include coordination with the Owens Valley Mosquito Abatement Program and minimizing standing water.

3.11. Description of Gravel

Gravel is one of the three methods of dust control approved under the 1997 and later SIPs. The performance standard for gravel consists of 100 percent surface coverage by a four-inch layer of coarse gravel. Gravel prevents PM_{10} emissions by:

a) preventing the formation of efflorescent evaporite salt crusts on its upper surface because the large spaces between the gravel particles interfere with the capillary forces that otherwise transport the saline water to the surface where it evaporates and deposits salts, and

b) raising the threshold wind velocity required to lift surface particles so that transport of gravel is not possible by wind speeds typical of the area (1997 SIP EIR).

Gravel dust control is only on a 90-acre area bordering Corridor No. 1 which is the access road to DCMs in the northwest portion of the lake bed. Environmental documentation for the use of gravel has also been approved for a 40-acre area in the Southern Zones DCA, but this has not been implemented. If gravel is selected to replace current DCMs a project-level environmental analysis would be required.

There is virtually no maintenance required of gravel unless it fills with finer material.

3.12. Description of Moat and Row

In 2006, during the settlement negotiations between the District and the City over the District's determination that additional controls were necessary on Owens Lake beyond the 29.8 square miles required by the 2003 SIP, LADWP proposed a new Owens Lake PM_{10} control measure known as moat and row. The Settlement Agreement that resulted from the 2006 negotiations contains provisions for up to 3.5 square miles of moat and row to be constructed in the 2008 SIP control area.

The general form of the moat and row DCM is an array of earthen berms (rows) about 5 feet high with sloping sides, flanked on either side by ditches (moats) about 4 feet deep. Moat and row elements generally include placement of up to a 5-foot high sand fence on the top of the row. Moats serve to capture moving soil particles, and rows physically shelter the downwind lake bed from the wind. Figure 7 depicts an element of moat and row element in an area constructed to test measures dust control efficiency. Depending on the control efficiency required some areas may have no moats and sand fencing placed level with ground elevation (i,e. not on a row).

Figure 7. Moat and Row Element with a Sand Fence

A moat and row element consists of an earthen berm (row) approximately 5 feet high with 1.5:1 (horizontal to vertical) sloping sides and a base of up to 19 feet wide, an access road on both sides of the row of up to 15 feet wide, flanked on the other side by ditches (moats) approximately 4 to 5.5 feet deep and up to 20 feet wide at the widest point. Rows serve as wind breaks and the primary function of the moats is to capture sand. Moat and row elements are typically arrayed in a grid pattern with most elements oriented perpendicular with the primary and secondary wind directions. The predominant winds are from the north-northwest and the south, with the north-northwest–blowing wind the strongest but less frequently. Moat and row elements are occasionally placed at the perimeter of moat and row DCAs.

Other features that are occasionally constructed within the moat and row DCAs include sand fences, which would also physically shelter the lake bed from blowing winds. Sand fences are generally constructed of a mesh fabric up to 5 feet tall with up to 14-inch diameter round or square stainless steel or arsenic-free, treated wood posts supporting the fabric. The sand fences are on top of rows or in open playa areas, as determined to be appropriate through modeling or on-site monitoring of prevailing wind direction and speed.

The spacing and density of moat and row elements and sand fence elements would generally vary from approximately 100 feet to 1,000 feet on center. These spacing dimensions are in both the principal and secondary directions of the grid and depend on the MDCE required.

3.12.1. Various Enhancements

Construction of the moat and row DCMs may also include the application of a variety of enhancements to boost dust control efficiencies where neccessary. These enhancements would be implemented in response to monitoring of PM_{10} emissions in the moat and row DCAs. In general, LADWP monitors air emissions from the lake bed via visual observations, field measurements, and detailed modeling that can help identify where the emissions originate. From the data collected, LADWP determines whether the dust emission objectives from the 2008 SIP are being met. If exceedances occur, LADWP may take corrective actions to reduce dust emissions. Before enhancements are implemented, LADWP will coordinate with the District regarding the specifications.

Five enhancement options would be considered as described below. These enhancements would ensure that if significant dust sources (i.e., hot spots) develop in the moat and row DCAs, they would be promptly addressed. Any single method or combination of the enhancements could be implemented where demonstrated to be in substantial conformance with the performance standards for the moat and row DCM. Many factors would influence the determination of which enhancement method would be selected, with a preference for non-water or low-water consumption methods. These factors include, but are not limited to: soil type, crust condition, nearest water source, material availability, existing vegetation (if any) and time frame for implementing the enhancement.

3.12.2. Shallow Flood Enhancements

This enhancement involves applying water to the lake bed surface during the dust emission season (i.e., October 1 through June 30) to stabilize air emission areas. The water would flood the playa between the moat and row elements and would sufficiently wet surface soils to prevent dust emissions.

3.12.3. Managed Vegetation Enhancements

Vegetation has been shown to be effective at controlling dust. This enhancement would involve planting local, native drought- and/or salt-tolerant species in the moat and row area to stabilize emissive or eroding areas. Vegetation reduces sand motion by acting as a natural wind break. The enhancement works well for sandy and loose soils, allowing for easy root establishment and nutrient delivery. The vegetation would be planted between the moat and row elements or on the side slopes of the rows to assist with the reduction of dust. If determined to be appropriate based on the conditions and needs of the specific site, the vegetation would be placed on the undisturbed playa between or around the moat and row elements. Vegetation beds would be spaced wider and be slightly above grade when compared managed vegetation DCAs previously constructed on the lake bed. Irrigation, fertilization, and subsurface drainage would be provided as required.

3.12.4. Moat and Row Augmentations

This enhancement involves the construction of additional moat and row elements to shorten unobstructed space (i.e., open playa areas) and to provide a greater number of features to capture mobile sand, thus reducing the rate of dust emissions. This enhancement would be implemented if existing elements prove to have insufficient control efficiency.

3.12.5. Row Armoring Enhancements

This enhancement would entail armoring rows and or roads with crushed rock or gravel. The gravel would provide a protective cover over surface soils to prevent dust emissions. Application of the rock armoring would involve the use of dump trucks, a scraper, and an excavator. Crushed rock would be transported to the moat and row cell or element needing enhancement. On maintenance roads, the crushed rock would be applied via a scraper that would spread the rock across the road. On rows, the crushed rock would be transported to the row via a dump truck and applied to the face of the row by an excavator.

3.12.6. Application of Brine Enhancements

This enhancement would apply brine to the moat and row side slopes and to access roads in the moat and row DCAs. Brine is water with a high concentration of salt. Brine is produced in other DCAs. Within the shallow flooding areas, brine would be collected via a vacuum/pump truck and delivered to moat and row DCAs. The brineline could also be tapped. The brine would stabilize surface soils by creating a hardened salt crust (through the evaporation of water) on top of the emissive soils, which would substantially reduce dust emissions. Minimal maintenance of the brine collection facilities would be required. The pumps and brine lines would be inspected regularly for proper operations. If maintenance is required, it generally would involve the replacement of parts or repairing leaks in the pipeline. No major excavation or other maintenance activity would be required.

3.13. Operation and Maintenance

3.13.1. Moats

The function of the moat section of moat and row elements is to capture sand as the wind velocity is reduced by the row and/or sand fence sections. To keep the performance of this DCM at its highest level, removal of sand from the moats would need to occur when moat fill with sand. Based on data collected from moat and row demonstration areas, perimeter moats facing the predominant wind direction and adjacent to open lake playa would require the most frequent maintenance. Perimeter moats adjacent to shallow flood DCAs or managed vegetation areas and moats on the interior of moat and row DCAs would require less frequent maintenance because these areas have significantly lower levels of sand movement than elements adjacent to open playa. The frequency of maintenance of perimeter moats adjacent to open playa and facing primary wind directions is estimated to be once per year. Frequency of maintenance of interior DCA moats and perimeter moats surrounded by other DCMs is estimated to be once every 5 years.

Maintenance for removal of sand collected in the moats would be performed using a crawler type excavator, 10-wheel dump trucks, pick-up trucks, a water truck, and a bulldozer. The excavator would traverse the length of the maintenance road located between the moat and the row to remove sand from the moats and place it in the dump trucks, which would then transport the material and place it in a shallow flood pond.

Shallow flood ponds generally vary in depth and in some areas can have several feet of standing water. When sand is dumped into the shallow flood pond, if the sand does not extend above the water surface, then no additional actions would be required. If, however, the depth of the pond is too shallow to allow the dumping of sand, then the sand would be spread throughout the pond to the extent necessary to maintain a water layer over the sand. Water trucks would be used to control fugitive emissions along the maintenance road and to pre-wet the sand prior to excavation. The bulldozer would be on-site as a precaution to extricate equipment stuck in mud. Crushed rock or gravel may be placed on the maintenance road surface to stabilize the road during the maintenance activity. The specific shallow flood pond selected would depend on many factors, including the pond's proximity to the moat and row DCA and the depth of water in the pond. Deeper ponds would likely be selected for disposal, as they have additional "capacity" to accept sand while maintaining water cover. Sand would be distributed in the pond sufficient to provide water cover. Uniform distribution would not be required. If distribution is required to maintain water cover, these sand-spreading activities would occur in the summer when the cells are dry. Under no circumstances would excavated sand be removed from the lake bed and trucked to off-site locations.

If water is present in the moat, dewatering of the moat may be required. Water present in the moat would be pumped into a nearby pond, shallow flood area, or the open playa area. Upon completion of the material removal, water trucks would apply brine to the maintenance roads to rebuild the protective soil crust.

3.13.2. Rows

Erosive forces of wind and rain may cause degradation of the side slopes of the rows, which could transport soil materials into the moats. The top of the rows would be armored with crushed rock or gravel, and the rows would be compacted to reduce the effects of wind and rain erosion. Maintenance to the rows would likely follow a 10-year cycle consistent with the frequency of sand fence replacement. Row maintenance would consist of rebuilding eroded side slopes of the rows by using existing soil and rock materials.

It is possible, although unlikely, that there could breach of the rows as a result of water erosion or flash flooding. If this were to occur, immediate measures would be taken to repair the row. However, it is likely that the number of rows affected within a particular cell would be minimized, such that dust control effectiveness would change little.

3.13.3. Sand Fences

The sand fences have a design life of 10 years and would generally be replaced after this period has elapsed or as required based on maintenance needs. In areas where only a sand fence is present (i.e., no moat and rows), maintenance would be performed on an as-needed basis as determined during the monthly inspections. It is anticipated that material removal would need to occur once sand has reached 50% of the height of the sand fence (or approximately 2.5 feet). Sand built up against the fence would be removed using an excavator, dump trucks, and pick-up trucks supported by a bulldozer to extricate equipment stuck in the mud and a water truck to control fugitive dust emissions. Fencing disturbed by maintenance activities would be repaired as needed. Water trucks would apply brine to the access roads after material removal to rebuild the protective soil crust.

3.13.4. Other Maintenance Activities

Inspections of the moat and row DCAs would occur on a monthly basis or as needed after high wind events to verify that moats are free of debris and that sand fences are in proper working order. One person on an all-terrain vehicle (ATV) or in a pick-up truck would be able to perform the monthly inspection. Should a severe wind event (greater than 70 mph) occur, an immediate inspection of the moat and row DCAs would be initiated. Inspections would be conducted using a four-wheel ATV or a pick-up truck via access roads.

Operational activities in the moat and row DCAs would include sampling of water present in the moats and Snowy Plover protection measures as required in the 2008 SIP FSEIR (District) and the 2009 Revised Moat and Row FSEIR (LADWP) outlined in Section 6.

4.0 EFFECTS OF THE DUST CONTROL PROJECT ON WILDLIFE RESOURCES

4.1. Introduction

Wildlife resources at Owens Lake have been affected primarily by shallow flooding of large areas of barren playa. The Project area now supports over 16,000 acres of shallow flood DCM, 2,260 acres of managed vegetation, and 64 acres of gravel. Phase 7, to be implemented by 2010, will incorporate moat and row as a fourth type of dust control and add over 5,800 acres of additional shallow flooding. The following section will briefly discuss each DCM type with regard to elements that influence wildlife use, and then discuss current use of DCMs by wildlife.

4.2. Shallow Flood DCM

Two methods of shallow flooding are employed by LADWP on the lake bed. The first, which began operation in 2001, is known as sheet flooding and consists of releasing water from arrays of low-flow water outlets. This arrayed configuration creates large, very shallow sheets of braided water channels. Water depths in sheet flooded areas are typically at most a few inches deep. The lower edges of sheet flooded areas have containment berms to capture and pond runoff. These ponds are referred to as tailwater ponds. As a result, sheet flow cells, taken as a whole, contain a mosaic of conditions including shallow-ponding (1 to 6 inches deep), saturated soil surfaces, unsaturated areas including mounds, and ponding (1 to 2 feet deep). Sheet flow areas from Phase 1 are more variable in the diversity of habitat structure they provide simply because the site topography is more variable. This variation in topography occurs both naturally and due to berming and leveling activities conducted to achieve and maintain wetted area compliance.

The second method of shallow flooding is known as pond flooding. Pond flooded areas have water containment berms that allow ponds to be formed that submerge the emissive lake bed areas. These ponds are much deeper than sheet-flooded areas and can be up to four feet deep although up-gradient edges will consist of relatively shallow water. Ponded cells may also contain exposed playa or small islands, the amount of which may vary depending on the water level and local topography. All ponds are usually filled with freshwater directly from mainline but may receive tailwater from sheet flow or other ponds up gradient.

Shallow flood dust control cells are dissected by a network of dirt roads and dikes. Other non-wetted infrastructure associated with the Shallow Flood DCM includes raised berms, equipment pads, and their associated sloped shoulders. In some cases the shoulders are rock-faced to protect them from wave erosion. Well-traveled roads are typically paved with gravel; less-traveled roads and berms are unpaved.

Some, shallow flood areas that receive freshwater support various wetland plants including cattails (*Typha* sp.), sedges (*Carex* spp.), bulrush (*Scirpus* spp. and *Schoenoplectus* spp.), spikerush (*Eleocharis* spp.), rush (*Juncus* spp.), borax weed (*Nitrophila occidentalis*), Yerba Mansa (*Anemopsis californica*) as well as occasional woody species including willows (*Salix* spp.) and Fremont cottonwood (*Populus fremontii*).

The salinity of various DCM cells, as defined by Herbst (2001a) based on invertebrate communities can be found in Table 5. Freshwater habitat is less than 5mS/cm, brackish habitat is between 5 and 25 mS/cm, saline habitat is between 25 and 100 mS/cm and hypersaline habitat is above 100 mS/cm. This salinity designation is based on recent monitoring in the spring season of 2009 and may change throughout the dust control season and in future years, depending on operations and site water application.

Table 5. Salinity of Various DCM Cells

Freshwater <5 mS/cm	Brackish 5 - 25 mS/cm	Saline 25-100 mS/cm	Hypersaline >100 mS/cm
T29-1	T28N	T1-1	T11
T30-1	T28S	T13-1	T13-3
	T29-4	T13-2	T24
	T30-2	T18N	T2-4
	T30-3	T18S	T36-3
	T36-1	T2-1	T36-4
	T4-3	T2-2	T3NE
		T23NE	
		T23NW	
		T23SE	
		T23SW	
		T25N	
		T25S	
		T26	
		T27N	
		T27S	
		T29-2	
		T29-3	
		T35-1	
		T35-2	
		T36-2	
		T4-4	
		T9	

4.3. Wildlife Use of Shallow Flood DCM

The implementation of water-based dust control measures has promoted wildlife resources at Owens Lake. The effect has been most notable with regard to bird use of the Project area, the only wildlife for which population data is available. Information regarding the effect on insects, amphibians, reptiles, and mammals is based on opportunistic encounters, general field observations, and known habitat relationships.

4.3.1 Insects

Four species of tiger beetles that occur on Owens Lake have benefited from the increase in moist playa habitat associated with shallow flooding: *Cicindela tranquebarica inyo*, *C. tenuicincta*, *C. willistoni psudosenilis*, and *C. haemorrhagica.* These species are found on wet to damp unvegetated playa sometimes in proximity to vegetated areas. *C. haemorrhagica* is the most abundant species and widespread species. Tiger beetles are commonly observed in damp areas within shallow flood DCMs but have not been identified to species. Due to the increase in habitat of wet unvegetated playa provided by shallow flood dust control, the abundance and distribution of tiger beetles has increased.

Approximately 81 aquatic invertebrate taxa were identified in samples from aquatic habitats adjacent to and on Owens Lake playa before shallow flooding began (Herbst 1997). The composition of the aquatic invertebrate community varies with the salinity of the water; fewer species are found as the salinity increases but high salinities produce the greatest density of insects. The salinity of shallow flood ponds is such that more saline tolerant species dominate with the most abundant taxa being brine flies.

Brine flies (*Ephydra spp.)* have become the most abundant aquatic invertebrate on previously barren playa with the initiation of shallow flooding. These aquatic invertebrates have become the major forage for various waterbirds that use Owens Lake DCMs. The two *Ephydra* species (*E. auripes* and *E. hians*) can be found around the shore in virtually every shallow flood DCM cell with appropriate water salinity. These larger soft-bodied species are the most abundant in the salinity ranges found in shallow flood and therefore the most important insect for wildlife forage.

Another species that has become quite common in certain areas is brine shrimp (*Artemia* sp). These shrimp were never found in any lake fringing habitats surveyed although non-viable cysts were found on the west shore in 1989 (Herbst 2001). *Artemia* were found in early 1900 in the main body of the lake (Lee 1906). Brine shrimp have colonized some DCM cells and can occur in relatively large densities. Observations of *Artemia* have occurred in at least eight areas with ponded saline water including Phase 4 and Phase 5 shallow flood cells as well as Phase 1 sheet flow shallow flood areas. These cells are T11, T13-3, T18S, T18N, T26, T28, T36-2, and T29-2. One species (*A. franciscana)* is widely distributed over both North and South America and occurs in many salt ponds in San Francisco bay (Warnock 2002) as well as the Great Salt Lake (Aldrich and Paul 2002). This species is a very successful colonizer of many inland saline water bodies (Castro et al. 2006).

Other salt tolerant invertebrate species that are abundant in shallow flood include a water boatmen in the Family Corixidae (*Trichocorixa reticulata*), two hydrophilid beetles (*Tropisternus sublaevis*) and (*Helophorus* sp), a Dysticid beetle (*Hygrotus masculinus*), a biting midge larvae (*Culicoides* sp), a Hydraenid beetle (*Ochthebius interruptus*), and true flies in the family Dolichopodidae (*Hydrophorus* sp). Zooplanktonic organisms that occur in high salinity shallow flood include water fleas (*Daphnia major*) and copepods (*Leptodiaptomas connexus*), which can produce dense populations. Larvae of mayflies (*Callibaetis* sp) and damsel flies (Family Coenagrionidae) have also been found in shallow flood areas with lower salinities (ecological toxicity sampling in 2008). Algae (*Dunaliella* sp.) were found to colonize high salinity areas (Herbst 1997).

A few other salt tolerant taxa were found in saline irrigated habitat (EC greater than 20 mS/cm) in shallow flood test areas during fall 1998 sampling and would be expected to occur in shallow flood DCMs. These taxa were: two water boatmen in the family Corixidae (*Corisella decolor* and C. *inscripta*), a back swimmer in the family Notonectidae (*Notonecta unifasciata*), a Dysticid beetle (*Stictotarsus coelamboides*), two deerfly species (*Tabanus* sp. and *Chrysops* sp.), midge larvae (*Tanypus* sp), and two smaller brinefly species (*Lamproscatella salinaria* and *Ptilomyia occidentalis*) (Herbst 2001).

Invertebrate species, particularly species that prefer fresher water, will likely colonize some shallow flood cells as salt is leached from playa soils by freshwater application and carried down-gradient. Some areas may become too saline for invertebrates to persist as salt in the soils and groundwater moves to down-gradient DCM cells. It has been found that more mature habitats held greater diversity and increased density of aquatic invertebrates (Herbst 2001). Therefore, with continued operation of shallow flood and the build up of aquatic algae and diatoms (food sources), the abundance and diversity of aquatic invertebrates should increase.

4.3.2 Herpetofauna

The majority of shallow flood habitat is not suitable for reptiles. Most areas lack cover that reptiles need for thermoregulation and avoidance of predation. A large portion of shallow flood also contains open water that lizards avoid. Lizards have been observed utilizing roads in some areas where there is artificial cover, usually in the form of rip rap or infrastructure.

Immigration of three lizard species (Desert Spiny lizard, Side-blotched lizard and Long-nosed Leopard lizard) has been observed on roads adjacent to the created wetlands in T30-1. With the increasing wetland vegetation and associated insects to forage upon, this area has become suitable foraging habitat; with the placement of rip rap along culverts and other areas the needs for cover of these species have been met. The areas that contain suitable habitat, like T30-1, that are adjacent to shadscale scrub habitat, are the areas first to see colonization of the lizard species with general habitat requirements. Other areas with cover, usually along roads, have seen colonization by Side-blotched lizards, the most ubiquitous lizard in the Great Basin Desert.

With the increase in food insects due to DCMs, reptiles that prefer more open habitat, including Western Whiptail and Zebra-tailed lizard, may also visit the area to forage. These active foragers may travel relatively long distances in search of prey in adjacent shadscale scrub and may visit DCMs to prey upon terrestrial insects.

With the increase in lizard and insect abundance, discussed previously, snakes may become more abundant. The most abundant snakes found in upland scrub are Coachwhip and Gopher snake. Due to lack of cover for thermoregulation and escape from predation, these reptiles would likely use only a small subset of DCAs that meet their habitat requirements. This would again be most likely to occur adjacent to preferred habitat along the shoreline, particularly as vegetation develops in shallow flood.

4.4. Birds

The bird community of the shallow flood DCM is composed primarily of waterbirds including waterfowl, grebes, shorebirds, and gulls. Tables 6 through 9 show the results of seven lake-wide bird surveys conducted in the Project area since December 2007. The data presented are for bird observations within the Project area only. While other survey and opportunistic data are available, the information presented here is from the most complete lake-wide surveys available, and represents the seasonal composition of bird communities in the entire Project area.

For the purpose of data review and discussion, seasons were defined with respect to migration patterns of waterbirds. Spring will be considered as the period from mid-February to mid-May, summer as mid-May through June, fall as July through mid-November, and winter as mid-November through mid-February. The information provided is based upon surveys of the Project area in 2007 and 2008 conducted by LADWP Watershed Resources staff, by volunteers of Eastern Sierra Audubon during Big Day surveys, and by Point Reyes Bird Observatory (PRBO). The seven lake-wide surveys since 2007 include two spring, one summer, three fall, and one winter survey. A complete list of all bird species seen on Owens Lake is in Table14.

4.4.1 Waterfowl

Before implementation of shallow flood, the majority of the Project area was barren, usually dry playa. Playa areas generally did not support waterfowl populations, except in the vicinity of artesian wells (such as Sulfate Well) and at the north end of the brine pool in the winter when fresh water from the Owens River flowed out into the brine pool. Shallow flooding cells are now used regularly by migratory waterfowl.

Waterfowl on Owens Lake can generally be divided into three guilds as follows based on taxonomy in Livezey (1986): 1) geese (Subfamily Anserinae), which are generally terrestrial feeders on vegetation; 2) dabbling ducks (Subfamily Anatinae, Tribe Anatini), which feed on the surface; and 3) ducks that may dive when foraging, which include the diving ducks (Tribe Aythyini), sea ducks (Tribe Mergini) and stiff-tailed ducks (Tribe Oxyurini).

Dabbling ducks make up the largest proportion of Owens Lake waterfowl. Approximately 89% of all waterfowl observed were dabbling ducks during seasonal lake-wide surveys in 2007 and 2008 (Table 6). Detailed discussion regarding the usage of shallow flood by dabbling ducks is below.

The most common non-dabbling duck is the Ruddy Duck comprising approximately 10% of waterfowl observed (Table 6). Half of all Ruddy Ducks seen on seasonal surveys were found in one brackish water cell T30-2. Ruddy ducks are primarily vegetarians but forage preference can depend on age, season, and location. Animal foods were more important for juveniles (Belrose 1980). When aquatic plants are not abundant, such as in turbid brackish estuaries, then animal matter including clams and snails was the bulk of their diets (Stewart 1962). Ruddy Ducks may regularly dive for food in water 2 to 10 feet in depth but they have been found to occasionally feed on the surface or simply immerse their heads (Belrose 1980). Further, Ruddy Ducks are more prone to feed in small bodies of water than other diving ducks and have been found to feed in ponds excavated for highway fill (Belrose 1980).

Other waterfowl that may dive when foraging in open water (Linduska 1964) are generally uncommon and consist of less than 1% in total abundance of all other species (Table 6). Some ducks including sea ducks (e.g Common Merganser) generally prey on fish (Belrose 1980) which do not occur in shallow flood. The diving ducks that occur on Owens Lake (e.g. Lesser Scaup, Bufflehead, and Redhead) occur in such small numbers that making inferences to area preferences are difficult. However, in general the cells with the highest abundance of these species are usually located in areas with dabbling ducks.

Waterfowl use of the Project area is greatest during fall. Dabbling ducks comprise the bulk of the waterfowl in the Project area. One species of dabbling duck (Northern Shoveler) accounted for over 50% of all waterfowl identified to species, and over 90% of all waterfowl in the fall. Overall, Northern Shoveler and Ruddy Duck have been the most abundant species using the lake. Due to the limited amount of wetland vegetation within the dust control cells, plant-based food sources are limited. In contrast, animal-based food sources such as alkali flies and other invertebrate species are abundant within shallow flood areas of the Project. Studies of the diets of Northern

Shoveler and Ruddy Duck have shown a preponderance of animal matter in their diet, thus they may be more suited to exploit available food resources in the Project area than species that are more vegetarian in their habits.

The first week of August 2008, 705 waterfowl were recorded during the early fall survey and were found utilizing both the north part of the lake (various cells in T-36 and T29) and in the middle of the lake (T18N and T18S) (Figure 18). By the third week of August (the Fall Big Day survey), 11,046 waterfowl (40% Northern Shovelers) were in the Project area, and were primarily utilizing the relatively saline ponds in T18N and T18S. While these ponds have higher salinity than ponds in the north, they are still within the range for maximum productivity of brine flies. The October 2008 survey was completed in two days over a three day period, which may have allowed movement of birds between ponds, and therefore double-counting. However, there were observations of large numbers of birds. On October 28, a large flock of ducks including more than 13,000 Northern Shovelers were encountered in cell T13-1 utilizing the eastern edge on the tailwater pond. Some individuals were foraging in the pond and some resting on the edge where sheet flow water runs into the tailwater pond in T13-1. This one day sighting accounts for most of the observed use of T13-1; usually this cell has relatively low use by waterfowl. On October 30, the north end of the lake, including the T29, T30, and T36 cells, were counted. Approximately 13,000 Northern Shovelers were found that day, distributed among several ponds. However, it is not known if the large flock of Northern Shoveler was still present at T13-1. The total number of waterfowl from the October 2008 survey is likely overestimated (Table 6); however, the location of the waterfowl can be informative.

Surveys performed during spring 2008 detected 4,935 waterfowl in March and 2,559 birds in April. The distribution of these waterfowl can be found in Figure 17. In spring, waterfowl use was highest at the north end of the Project area in the T29, T30, and T36 cells. The most abundant waterfowl species during spring 2008 were Ruddy Duck, Cinnamon Teal, and Northern Shoveler. A mid-winter count conducted in December 2007 detected 5,338 ducks with Northern Shoveler, Green-winged Teal, and Ruddy Duck predominating. Waterfowl were most concentrated in the T29 and T30 shallow flood areas with the highest number of individuals found in cell T29-1 (Figure 17).

Use of the Project area by waterfowl is notably less during non-migratory periods of the year. The fewest waterfowl are present during summer. The ducks present in mid-summer likely represent a mix of nesting and non-breeding individuals. Of the 654 ducks recorded in the Project area in the summer of 2008, Gadwall, Ruddy Duck, Mallard, and Redhead were the most abundant species. Suitable nesting habitat for these species is limited within dust control cells, but more readily available at lake-fringing seeps and springs and other wetland areas outside the Project area. Two Mallard with young broods were observed using dust control ponds in 2008 (Ms. Debbie House, personal observation). It is suspected that these birds nested outside the Project area. Brood use of the northern region of shallow flood has increased in 2009. Ruddy Duck and Redhead generally require dense marsh habitats for nesting, while Gadwall and Mallard are considered “upland” nesters, often nesting in grass-dominated sites, which may also contain shrubs.

The DCM cells that have attracted the greatest diversity of species are the T30 cells and the T4-3 habitat shallow flood and T4-4. At least 13 species of waterfowl have been seen in each of the T30 cells and in the habitat shallow flood cells (T4-3 and T4-4) (Figures 19 and 20). The T30 cells have some of the lowest salinity surface water on the lake and the most developed wetland vegetation. These lower salinity areas may also support a diverse aquatic invertebrate community. These ponds contain a few small islands (some are remnant spring mounds that were avoided during construction), upon which ducks are often seen resting. These cells are also adjacent to the Owens River delta and other springs and seeps that attract waterfowl. Despite its much smaller size than the T30 cell complex, the habitat shallow flood cell (T4-3) and the adjoining pond T4-4 have attracted the same number of species. In the habitat shallow flood area, waterfowl are commonly encountered at the interface of the outflow of the sheet flow into the tailwater pond, either foraging or resting on the mudflats or swimming in the shallow portion of the pond near the interface. The relative proportion of all waterfowl individuals observed by cell over all single day lake-wide counts can be found in Figure 8.

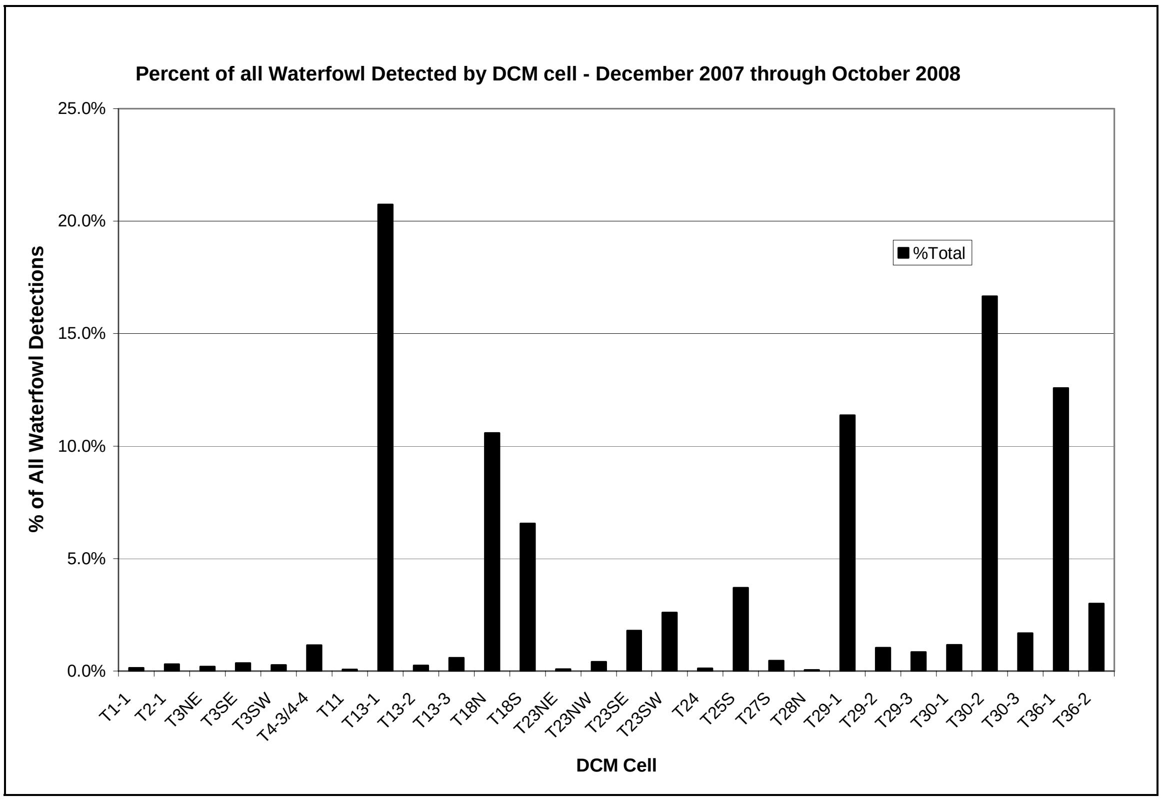


Figure 8. Percent of Waterfowl Detected by DCM Cell

4.4.2 Grebes and Cormorants

Eared Grebes (*Podiceps nigricollis*) are the most abundant grebe species at the lake and are frequently encountered in the Project area during spring and fall. Grebes are known to eat a variety of aquatic invertebrates. At Mono Lake and other fall staging areas, they feed largely in open areas on the lake on free-swimming brine shrimp; when foraging near shore, brine flies are important component of diet seasonally (Jehl 1988). Surface-feeding is common by skimming or pecking food from water, emergent rocks, floating wood, vegetation; and they will occasionally pluck insects (brine flies) from the air (Cullen et. al 1999). During migration shallow saline lakes and salt ponds are used throughout their range. In Minnesota, breeding Eared Grebes preferred large marshes with open water or submergent vegetation (Boe 1992).

The peak Eared Grebe count occurred in a late October survey in 2008 (Table 7). The cells that had the highest Eared Grebe use are ponded cells of various salinity ranges. The saline cells T13-3 and T18, in addition to freshwater cells T29 and T30, had the most use in fall while in spring Eared Grebes were less abundant in saline cells and more common in the freshwater and brackish cells T30, T36 and T29.

Other grebe species are rare and encountered infrequently. Pied-billed Grebes (*Podilymbus podiceps*) generally prefer areas with some emergent vegetation cover and the *Aechmorphorus* grebes are piscivorous. Therefore DCMs do not offer suitable food resources for *Aechmorphorus* grebes while Pied-billed Grebes are only expected to occur singly or in very small numbers due to their non-social behavior. Double-crested Cormorants have been seen in the Project area in the fall. Due to their propensity for eating fish, this species is also not expected to be abundant in the Project area.

4.4.3 Herons, Egrets and Ibis

Of this group, only White-faced Ibis are encountered somewhat regularly in the Project area, primarily in spring and fall. White-faced Ibis are typically encountered in areas supporting some emergent or wetland vegetation within dust control cells. The single largest group of birds (150 birds) was seen in late August in cell T30-1, which supports a substantial amount of wetland vegetation. Due to the lack of fish and other small aquatic vertebrate prey, this group is relatively uncommon at Owens Lake. Occasional Snowy Egret, Black-crowned Night Heron, and Great Blue Heron have been observed on shallow flood areas usually in areas adjacent to springs where mosquito fish are present.

4.4.4 Raptors

Raptors are encountered infrequently at the lake. The most notable effect that implementation of shallow-flooding has had on raptor use is the now regular occurrence of Peregrine Falcon at Owens Lake. On August 23 the fall 2008 Big Day count reported six Peregrine Falcons at the Project area. Due to the wide-ranging nature of this species and the very open viewing conditions available to birders, it is quite likely that this is an overestimate of the total number of individuals present. The conditions at the lake offer ideal conditions for Peregrine Falcons to hunt with vast open areas for pursuing and capturing the large number of waterbirds. A Bald Eagle was also observed feeding on waterbirds in shallow flood areas.

4.4.5 Rails

American Coot is the only rail species regularly encountered in shallow flood areas. Other rail species prefer areas with more wetland vegetation than currently exists. American Coot were most numerous during spring and fall in 2008, and were most abundant in the T29 and T30 cells. With the anticipated increase in wetland vegetation within the Project area, Sora and Virginia Rail can be expected to increase their use.

4.5. Shorebirds

Shorebirds are another group of species that have had a notable response to the implementation of shallow flood. Shorebirds were encountered in much smaller numbers using playa around seeps and springs during baseline surveys. Use by shorebirds is highest in spring and fall. Table 8 contains shorebird use data from specific lake-wide surveys discussed above. American Avocet and Least and Western Sandpipers are common spring and fall migrants. Wilson's and Red-necked Phalaropes are common fall migrants. Figures 21 and 22 show the distribution of the shorebirds observed in Table 8. Species richness observed in each cell can also be found by survey in Figures 23 and 24.

Shorebirds known to nest (or with the greatest potential to nest) in the Project area include American Avocet, Black-necked Stilt, Snowy Plover, Killdeer, and Long-billed Curlew. The most abundant breeding shorebirds at Owens Lake are American Avocet, Snowy Plover and Black-necked Stilt.

American Avocet prefer open areas that are barren or sparsely-vegetated to nest. American Avocet feed on aquatic invertebrates within the water column or in sediments, and on terrestrial invertebrates and seeds. When foraging, they will feed on mudflats, wade in water generally less than 20 cm deep, or swim in water up to 25 cm deep (Robinson et al. 1997). The numbers of American Avocet using Owens Lake has increased dramatically after the initiation of shallow flooding. The counts of American Avocet during the annual Snowy Plover survey are in Table 6. In 2003 over 92% of American Avocet adults were found in Zone 2 which is the north Project Area. This pattern has shifted somewhat among years with Central Region becoming relatively more heavily utilized in 2006 and 2007. This pattern has subsequently shifted back to the north. At Owens Lake, American Avocet were observed nesting on roadways, berms, and within shallow flood cells.

Like American Avocet, Black-necked Stilt can be found in open to sparsely-vegetated areas. As compared to avocets, Black-necked Stilt may show a preference for lower salinity and higher cover of vegetation. These shorebirds tend to nest in small numbers in or adjacent to American Avocet colonies. Black-necked Stilt feed on aquatic invertebrates while wading in water up to a depth of 130 mm. The number of Black-necked Stilts detected during Snowy Plover counts has increased from 10 adults in 2002 to 61 adults found in 2007 to 100 in 2008. Nesting has been confirmed through the sighting of flightless young, generally late in summer in a couple of DCM areas.

Table 6. Number of American Avocet During Snowy Plover Surveys

Region		**Year**					
		2004	**2005**	**2006**	**2007**	**2008**	**2009**
North	Non-project	0	0	0	0	8	0
	Project	2792	1511	309	653	4568	4121
North Subtotal		**2792**	**1511**	**309**	**653**	**4576**	**4121**
South	Non-project	16	162	2	49	37	0
	Project	5	62	9	422	215	181
South Subtotal		**21**	**224**	**11**	**471**	**252**	**181**
West Shore	Non-project	48	16	0	0	46	56
West Shore Subtotal		**48**	**16**	**0**	**0**	**46**	**56**
Central	Non-project	32	12	11	12	18	6
	Project	0	0	773	1931	1243	376
Central Subtotal		**32**	**12**	**784**	**1943**	**1261**	**382**
Total		**2893**	**1763**	**1104**	**3067**	**6135**	**4740**

4.5.1 Snowy Plover

The Snowy Plover is a cosmopolitan species with populations in North and South America, Europe, Africa and Asia. The Western Snowy Plover is one of two subspecies in the continental United States. The distribution of Western Snowy Plover includes the Pacific coast from Washington State south to Baja Sur, California, and several inland locations in the western United States and Mexico. The Pacific coast populations, defined as those individuals that nest adjacent to or near tidal waters, are considered a Distinct Population Segment and were designated as threatened under the Federal Endangered Species Act (FESA) in 1993 (Federal Register 1993); Critical Habitat was designated along portions of the Pacific coast for this species in 1999 (Federal Register 1999). The interior populations are not listed under the FESA, but are designated as a Species of Special Concern by CDFG.

There is ample evidence that the Pacific coast populations are reproductively isolated from interior populations. Instances of interbreeding were very infrequent in spite of intensive banding surveys of coastal and interior populations (Federal Register 1993). However, individuals from interior populations apparently winter along with the coastal populations in coastal areas in Southern California and Baja California (Garrett and Dunn 1981, Grinnell and Miller 1944).

Snowy Plover at Owens Lake are part of the interior nesting population. The earliest account of this species at Owens Lake was in 1891 by A. K. Fisher, when birds were observed during the breeding season, although nesting was not confirmed. Nesting was first confirmed in 1975 when adult plovers were first seen accompanied by downy young (McCaskie in Ruhlen, Page, and Stenzel 2006).

Habitat Requirements

Inland nesting Snowy Plover breed throughout the west in barren to sparsely vegetated areas at reservoirs and ponds, alkaline lakes, and salt evaporation ponds in the vicinity of temporary or permanent water which provides conditions suitable to support the production of invertebrate food sources.

The primary forage base available for Snowy Plover and other shorebirds at Owens Lake is brine fly larvae, pupae, and adults (*Ephydra* spp.). Only anecdotal information exists regarding the food habits of Snowy Plover, but at inland sites, this species is reported to forage on various invertebrates such as flies (*Ephydra* spp. and others), beetles (Order Coleoptera), true bugs (Order Hemiptera), and brine shrimp (Family Artemiidae) (Page et al. 1995).

At Owens Lake, the optimal breeding habitat of the Snowy Plover appears to be open, dry playa within 0.5 miles of springs, seeps, outflows, or shallow flooding that supports invertebrate production. Before shallow flooding in the NSS in 2002, Snowy Plover breeding at Owens Lake was restricted to areas within 1,200 meters (m) of natural springs and outflows on the lake playa.

Snowy Plover prefer some topographic or substrate color variability to obscure nest sites. Henderson and Page described nesting habitat for Western Snowy Plover on inland lakes in 1979 (District 1998).

> "Although non- to lightly-vegetated flats were the major nesting habitats at the lakes, nests were often well concealed because of topographic features in the immediate vicinity of the nest. Of 45 described nests on flats in the Salton Sea, Owens Lake, Honey Lake and the Alkali Lakes, 40% were within 15 cm of some object such as a stick, rock or clump of vegetation. 22% were on sand-pebble substrate with topographic relief of at least 5 cm within a one-meter radius of the nest, and 13% were on sand-pebble substrate with a topographic relief of less than 5 cm. 4% of the nests were on silt or sand with a topographic relief of 5 cm or more within a one-meter radius of the nest. 9% were at the edge of marsh vegetation. The remaining 11% of the nests were on flat (topographic relief less than 5 cm) sand or silt away from vegetation or other irregularities on the substrate, and thus were readily visible from a distance. Of all the nests on the lake flats 27% had some vegetation within a one-meter radius and 51% within a ten-meter radius. 44% were on some elevated structure such as a low mound or a ridge."

Life History

Nesting at Owens Lake historically has been initiated in mid-March, with the majority of nests found in May and June and a few active nests in July. Before water from shallow flooding and associated forage was present into summer, nesting was rarely initiated in July. In July 2003, during the second year of shallow flood operations, a total of 14 nests were initiated.

Females generally lay three eggs per nesting effort, typically laying one every other day during a 6-day period. Incubation lasts from 25 to 32 days and may vary with time of year. The fledging period or time from hatching until first flight varies from 29 to 33 days. The females normally incubate the eggs during the day, while the male incubates at night (Page and Stenzel 1979).

Females typically abandon chicks within 2 to 5 days after hatching; the males are left to take care of chicks until they fledge. Females may double-clutch (or in rare cases triple-clutch). 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. Small numbers of Snowy Plover have been found occasionally at Owens Lake in winter.

Population Size – Lake-wide Surveys

The first lake-wide survey was conducted in 1978, in conjunction with surveys conducted statewide. In 1978, 499 adult Snowy Plover were counted at Owens Lake (Ruhlen, Page, and Stenzel 2006). Subsequent surveys were completed nine times between 1988 and 1999. In this time period, the average number of Snowy Plover at Owens Lake was 145.

In 2000 and 2001, the two years immediately prior to implementation of shallow flooding, lake-wide surveys estimated 112 and 167 Snowy Plover at Owens Lake (Ruhlen, Page, and Stenzel 2006). Shallow flooding of Zone 2 was a feature of the landscape by the breeding season of 2002. Snowy Plover appeared to respond rapidly to this change as Zone 2 supported 55.9% of adult plovers at the lake in 2002 as compared to 8.9% of the total in 2001. The number of adult plovers using the lake continued to increase as more DCM cells became operational. In 2004, the number of Snowy Plovers peaked at 658, the highest number ever recorded on a lake-wide survey. The 2007 survey showed a slight decline from the peak number of plovers counted. This decline in adult numbers appears to have occurred in the coastal population as well. Inland populations winter with coastal populations and PRBO speculates that they may have experienced high levels of mortality along with the coastal population during the cold winter in the 2007 Snowy Plover Survey Report. Since 2007 Snowy Plover numbers have again increased. Figure 9 shows the number of adult Snowy Plover detected during lake-wide surveys conducted between 1978 and 2009.

As temperatures increase in the summer and water levels from natural springs recede, the proportion of plovers in shallow flood areas increased. In 2003 an early May survey found 63% of adults utilizing shallow flood whereas in late July 93% of all adults utilized shallow flood.

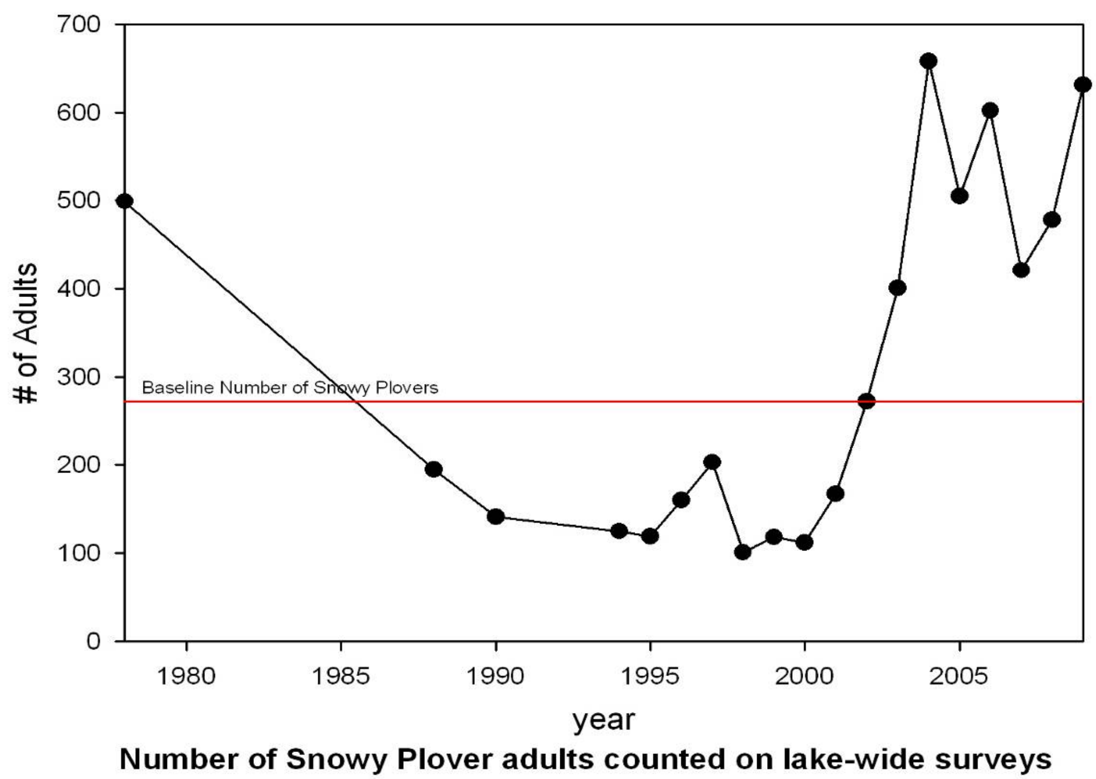


Figure 9. Number of Snowy Plover Adults on Owens Lake

Nesting at Owens Lake and in the Project Area

In 2000, intensive nest searching was conducted to gather information regarding pre-project use by plovers of the Project area. The areas surveyed were Phase I sites including the areas formerly referred to as Zones 1, 2 and 4 and some other outflow areas including Hutchinson Well, Sulfate Well, and the North Keeler Seeps. Figure 10 shows the Snowy Plover nest locations in 2000. Zone 2 contains the District shallow flood test area. The largest concentration of Snowy Plover was found in association with the shallow flood test area. Snowy Plover were found in smaller concentrations at seeps and springs and outflow areas of artesian wells such as Hutchinson Well.

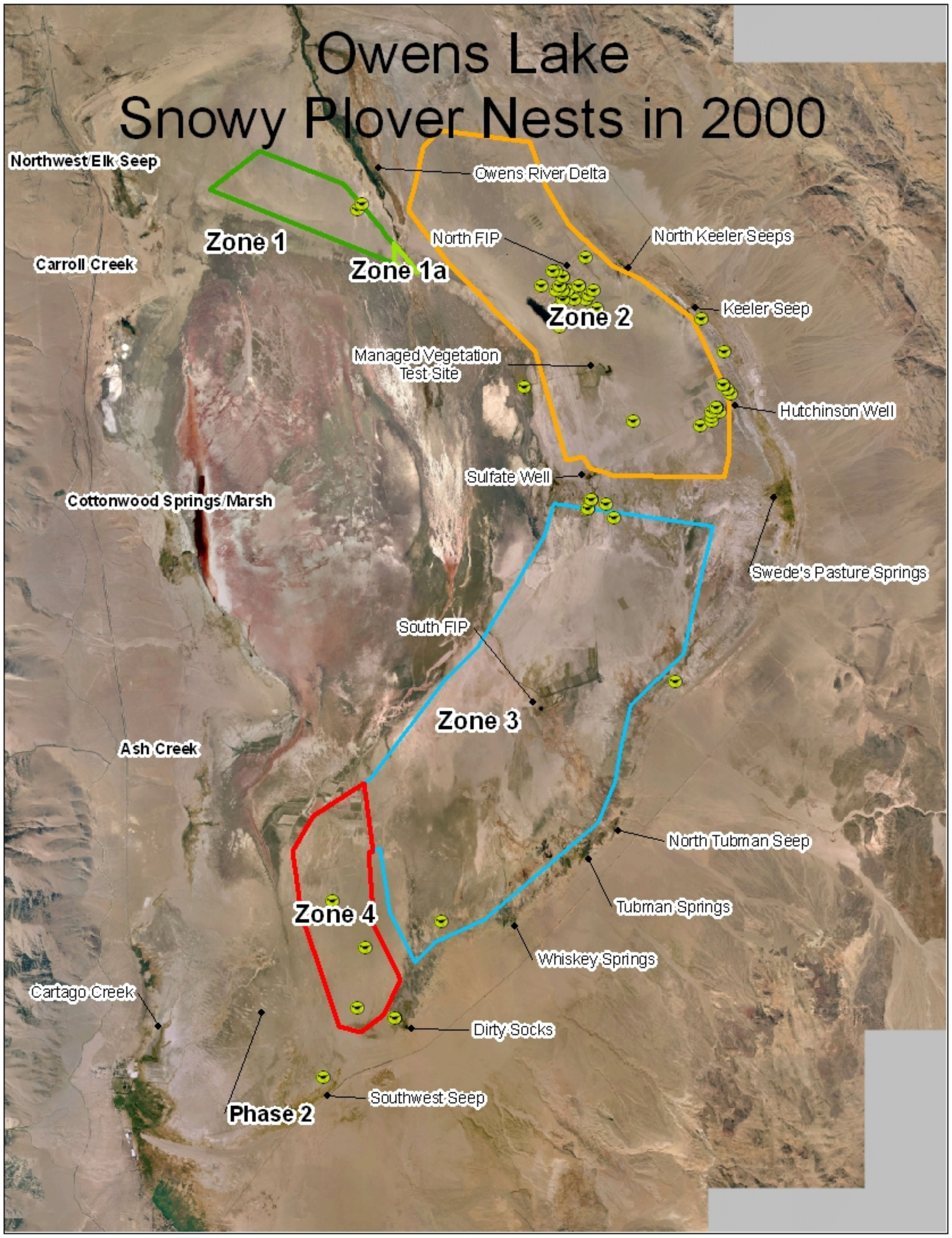


Figure 10. Snowy Plover Nests Found in 2000

In 2001, intensive nest searches were conducted again to gather information regarding pre-project use by plovers of the Project area. Preconstruction clearing surveys were also conducted and any nest found during these surveys was documented. The areas surveyed were Phase I sites including the areas formerly referred to as Zones 1, 2, 3 (southern part only) and 4 and some other outflow areas. The area between the western edge of Zone 4 and Cartago Springs outflow was also surveyed. Figure 11 indicates the areas where surveys were conducted and Snowy Plover nest locations. In Zone 2, plover nests continued to be found around seeps and artesian well outflow areas. More intensive surveys were conducted in Zone 1, possibly resulting in an increase in the number of nests found. Large numbers of nests were also found in the southern half of Zone 3, and in the area east of Cartago Springs, areas not surveyed in 2000.

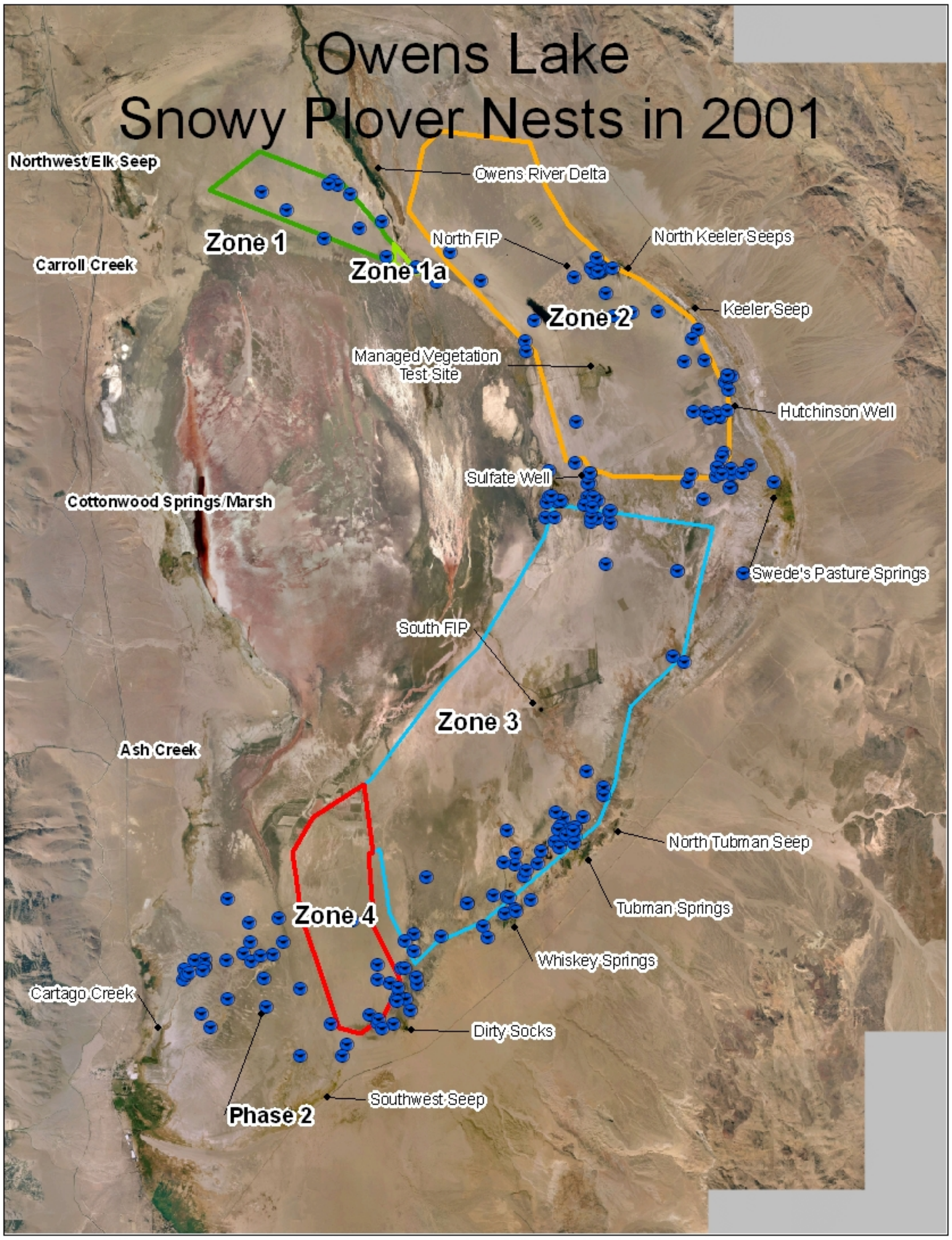


Figure 11. Snowy Plover Nest Locations in 2001

Pre-project nest surveys and preconstruction clearing surveys continued in Zones 1-4 in 2002. Shallow-flooding had been initiated in Zone 2, but not in the other zones. Figure 12 shows the areas surveyed and the location of nests found. In its first year of operation, Zone 2 attracted the bulk of nesting Snowy Plover in the Project area. Over half of all adult Snowy Plover counted during the lake-wide survey in May 2002 were detected in Zone 2 as compared to approximately 9% of total adult birds in 2001. Although shallow flooding had already been initiated in 2002, the baseline number of Snowy Plover was based on the 2002 lake-wide count of 272 adults.

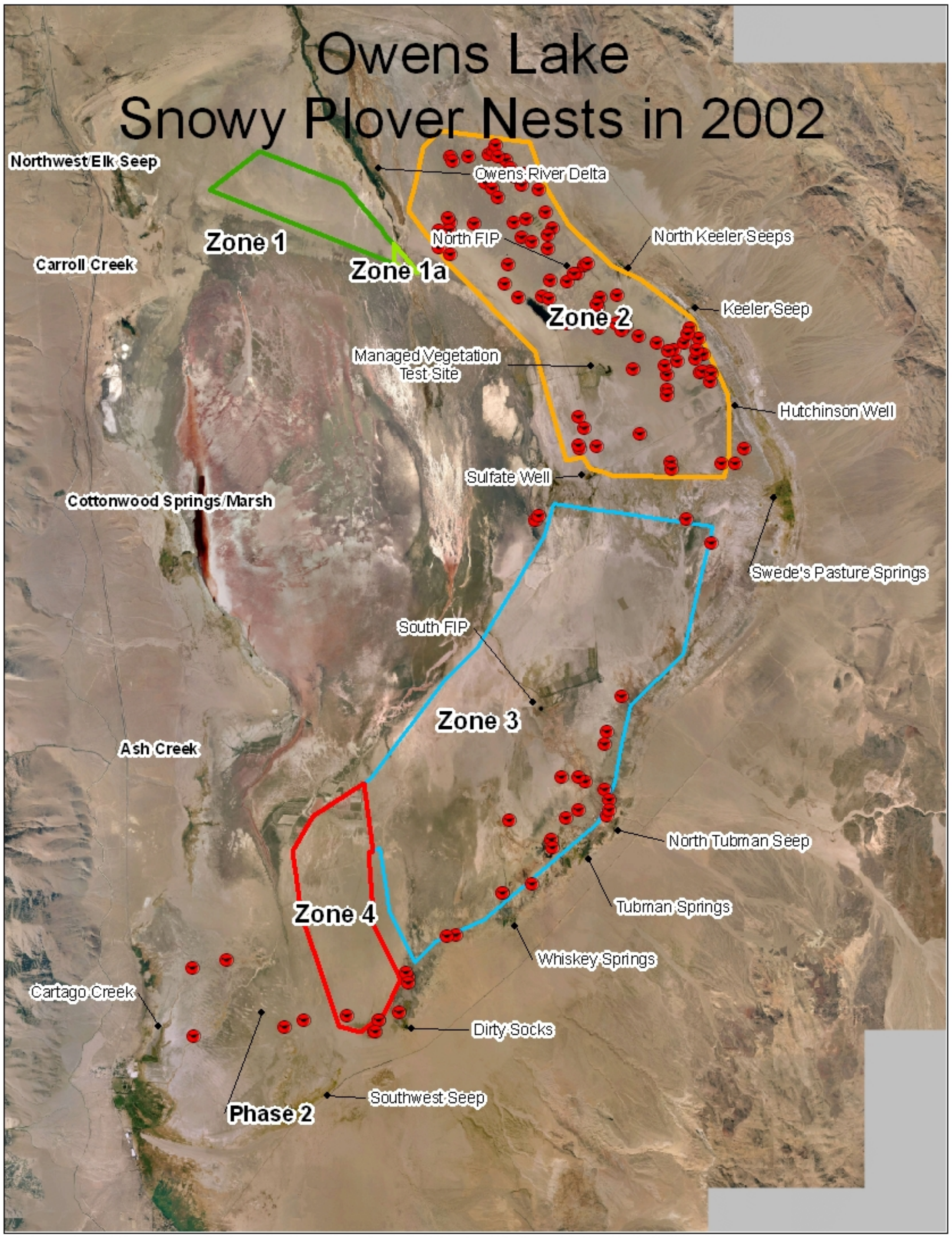


Figure 12. Snowy Plover Nest Locations in 2002

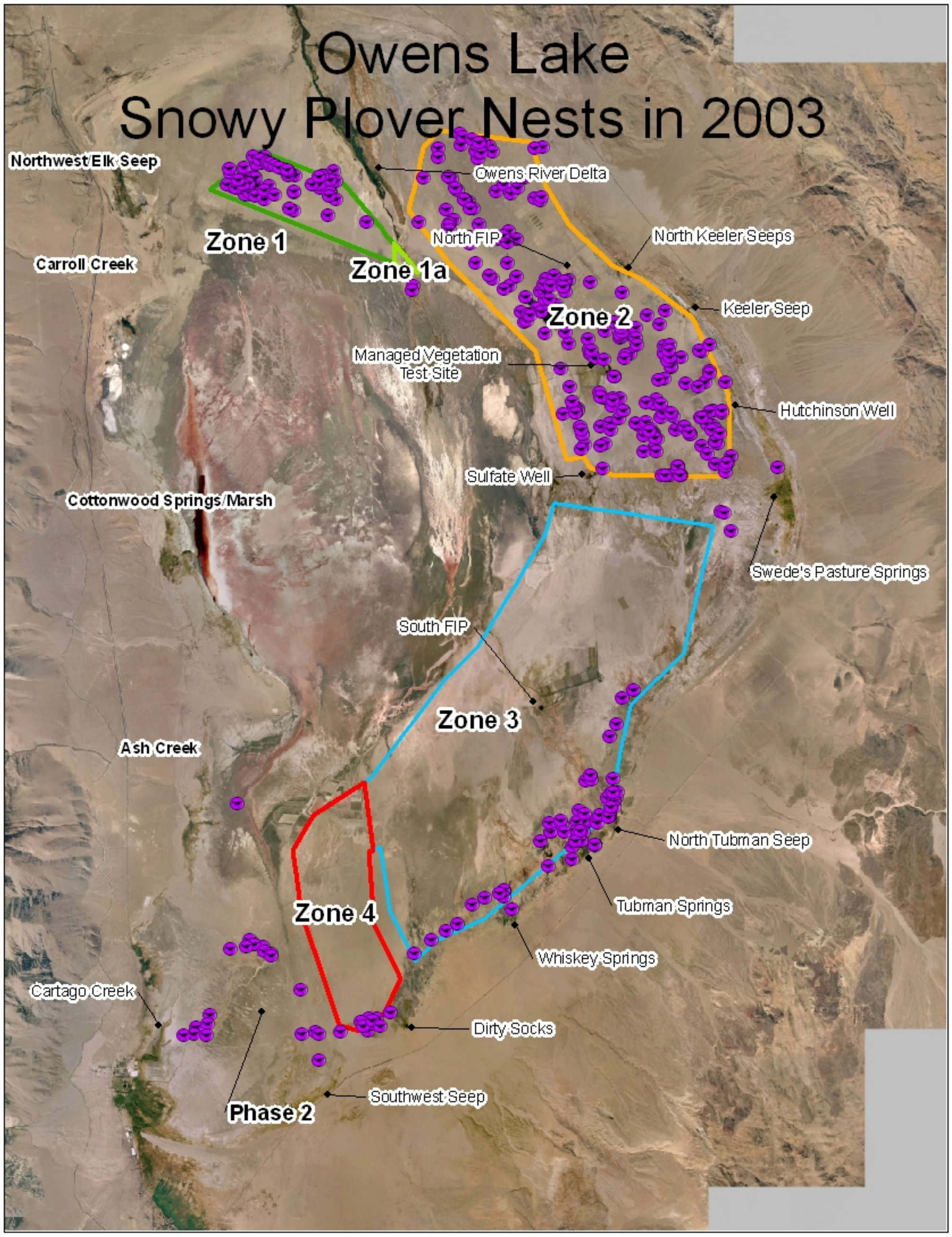


Figure 13. Snowy Plover Nest Locations in 2003

The last intensive nesting surveys for Snowy Plovers were conducted in 2003 (Figure 13), but the fate of each nest was not monitored closely.

Not only has shallow flooding increased Snowy Plover nesting it has also extended the nesting season. Ruhlen, Page, and Stenzel (2006) found that before implementation of shallow flood, or in natural areas after implementation, few nests were initiated after the fourth week of May, whereas in shallow flood DCMs over half of the overall Snowy Plover nests were initiated after the fourth week in May.

Nest Success

The rate for clutch hatching in Zone 2 was 87% in 2002 - higher than the hatching rate reported following the 2001 surveys (42%, n=26). Of the 91 nests located in or near Zone 2 in 2002, 78 nests hatched, 12 nests failed, and 1 had an unknown fate. Nest failures resulted from raven depredation, predation by unknown predators, and flooding during windstorms. One nest was flooded due to fluctuation in water levels. In 2002 many individuals were believed to double- or triple-clutch (that is, established multiple nests and raised successive broods through the season) in Zone 2. This behavior is typical in optimal habitat and environmental conditions. Nests found in and near Zone 2 accounted for 71% of the 128 total nests found in 2002 in contrast to only 26% of the 98 nests in 2001. These changes correspond to the beginning operation of shallow flooding in Zone 2.

In Zone 3 there were 21 Snowy Plover nests found in 2002 and 95% of those nests successfully hatched. There were 16 Snowy Plover nests found in Zone 4. Seven of these nests were predated for a 40% hatch rate. The overall hatch rate in 2002 was 82% compared to a hatch rate of 54% for 2001. The difference was mostly attributed to abandoned nests and nests that failed to hatch despite incubation to term in 2001.

In 2002 the average distance of a nest to water in Zone 2 (where 71% of all nests were located) was 8 meters (S.E. =1) compared to 336 meters (S.E.=75, n=26) in 2001, before shallow flood was operational. The distance to water likely played a role in Snowy Plover nest success, particularly late in the season because adults will fly to standing water to drink and cool their belly feathers which allows them to cool their eggs. During periods of extreme heat and drying of freshwater outflows to the lakebed, water sources are farther away, and eggs are left unattended for longer periods. The farther the distance to water, the longer the eggs may go unattended and be more susceptible to overheating or other damage.

Project-Associated Nest Disturbances

Ruhlen and Page (2001) conducted field surveys of Snowy Plover behavior during potential disturbance activities near breeding sites. In summary, Ruhlen and Page found that plovers responded with a high-level reaction (flew, ran, or did a broken-wing display) about 20% of the time when human disturbance was within 500 meters. Plovers responded with a low-level reaction (chicks or adults stood erect in an alert posture, head-bobbed, called, crouched, looked up, or hid) about 26% of the time where disturbances were up to 1,000 meters distant. Plovers had no reaction 44% of the time to disturbances over 1,000 meters distant.

Snowy Plover with nests seem remarkably tolerant of construction work and vehicles that are greater than the requisite 152 meters buffer zone and on several occasions have initiated nests within 243 meters of active construction work. Plover broods apparently acclimate to slow-moving vehicles and traffic, but they react more strongly to people walking on the playa, getting out of vehicles, or other disturbances.

Table 7. Waterfowl Observed During Various Seasonal Lake-Wide Surveys (2007-2008)

			Season and Survey Date							
			Winter	Spring		Summer	Fall			
Species Group	**Tribe or Subfamily**	**Common Name**	12/13/2007	3/19/2008	4/19/2008	5/27-6/1/2008	8/7/2008	8/23/2008	10/28-10/30/2008	**Total**
Waterfowl	Anserinae	Snow Goose							2	**2**
	Anserinae	Ross's Goose							23	**23**
	Anserinae	Canada Goose					1		2	**3**
	Anatini	Gadwall	57	62	197	251	2	5	339	**913**
	Anatini	American Wigeon	16	14	56	13			228	**327**
	Anatini	Mallard	2	45	44	88	67	35	198	**479**
	Anatini	Blue-winged Teal			5	1		2		**8**
	Anatini	Cinnamon Teal		686	595	22	1	98		**1402**
	Anatini	Northern Shoveler	2179	475	427	23	614	4511	35664	**43893**
	Anatini	Northern Pintail	2	61	12	24	1	24	143	**267**
	Anatini	Green-winged Teal	344	50	198	11		271	451	**1325**
	Aythyini	Canvasback	13	22	4					**39**
	Aythyini	Redhead			21	79	14	62	40	**216**
	Aythyini	Ring-necked Duck			7			1		**8**
	Aythyini	Lesser Scaup	1		73	1		1	31	**107**
	Aythyini	Bufflehead	4	19	49	10		3	62	**147**
	Mergini	Common Merganser			2					**2**
	Mergini	Red-breasted Merganser				2				**2**
	Oxyurini	Ruddy Duck	418	3256	839	129	5	13	3394	**8054**
	Anatini	Unidentified *Anas* species	2302	245				6003	10533	**19083**
	Aythyini	Unidentified diving duck			30					**30**
Waterfowl total			**5338**	**4935**	**2559**	**654**	**705**	**11029**	**51110**	**76330**

Table 8. Various Waterbirds Observed During Various Seasonal Lake-Wide Surveys (2007-2008)

		Season and Survey Date							
		Winter	Spring		Summer	Fall			
Species Group	**Common Name**	12/13/2007	3/19/2008	4/19/2008	5/27-6/1/2008	8/7/2008	8/23/2008	10/28-10/30/2008	**Total**
Grebes	Pied-billed Grebe			1					**1**
	Eared Grebe	39	253	1744		15	48	4150	**6249**
	Western Grebe	1		1				2	**4**
	Clark's Grebe			1					**1**
Grebe Total		**40**	**253**	**1747**		**15**	**48**	**4152**	**6255**
Cormorants	Double-crested Cormorant						25	1	**26**
Herons, Egrets and Ibis	Great Blue Heron						4		**4**
	Snowy Egret			2			2		**4**
	White-faced Ibis			28		6	297		**331**
Raptors	Osprey			1					**1**
	Northern Harrier			1					**1**
	Peregrine Falcon			1			6	1	**8**
	Prairie Falcon			1					**1**
Rails	Sora			1					**1**
	American Coot	138	248	1009		162	67	2393	**4017**

Table 9. Shorebirds Observed During Various Seasonal Lake-Wide Surveys (2007-2008)

		Season and Survey Date							
		Winter		Spring	Summer	Fall			
Species Group	**Common Name**	12/13/2007	3/19/2008	4/19/2008	5/27-6/1/2008	8/7/2008	8/23/2008	10/28-10/30/2008	**Total**
Shorebirds	Black-bellied Plover			9		2	3	7	**21**
	Snowy Plover	22		15	478	36	16		**567**
	Semipalmated Plover			27		18	6		**51**
	Killdeer	63	6	11		4	18	47	**149**
	Black-necked Stilt			63	200	421	969	4	**1657**
	American Avocet	592	6409	9809	6624	14931	16493	461	**55319**
	Greater Yellowlegs	12	1	148		15	60	20	**256**
	Lesser Yellowlegs			1		3	21	1	**26**
	Willet	2		3		21	7		**33**
	Spotted Sandpiper			8		11	34		**53**
	Whimbrel			5					**5**
	Long-billed Curlew	23		22		75	77	7	**204**
	Marbled Godwit	3		8		8	6	9	**34**
	Semipalmated Sandpiper						4		**4**
	Western Sandpiper	2	375	990		480	1579		**3426**
	Least Sandpiper	761	610	2673		143	3111	1	**7299**
	Baird's Sandpiper						21		**21**
	Pectoral Sandpiper						1		**1**
	Dunlin			938				43	**981**
	Short-billed Dowitcher			11			45		**56**
	Long-billed Dowitcher	4		20			32		**56**
	Wilson's Snipe			11					**11**
	Wilson's Phalarope			2		495	2535		**3032**
	Red-necked Phalarope			1		120	467		**588**
	Calidris spp.	117		9088		905	894	2155	**13159**
	Dowitcher spp.		1	12		78	90		**181**
	Phalarope spp.					5479	1034		**6513**
Shorebird Total		**1601**	**7402**	**23875**	**7302**	**23245**	**27523**	**2755**	**93703**

Table 10. Gulls, Terns, and Perching Birds Observed During Various Seasonal Lake-Wide Surveys (2007-2008)

		Season and Survey Date							
		Winter	Spring		Summer	Fall			
Species Group	**Common Name**	12/13/2007	3/19/2008	4/19/2008	5/27-6/1/2008	8/7/2008	8/23/2008	10/28-10/30/2008	**Total**
Gulls and Terns	Long-tailed Jaeger					1			**1**
	Bonaparte's Gull			50				13	**63**
	Ring-billed Gull			43		2	16	12	**73**
	California Gull		1230	13651	7381	2299	1931	145	**26637**
	Caspian Tern			11			1		**12**
	Common Tern						10		**10**
	Forster's Tern			10					**10**
	Black Tern						14		**14**
	Unidentified gull sp.						579		**579**
Gull and Tern Total		**0**	**1230**	**13765**	**7381**	**2302**	**2551**	**170**	**27399**
Perching Birds	Common Raven	2		19	108	52	33	1	**158**
	Horned Lark	146		7		31	130		**314**
	Tree Swallow					60	150		**210**
	Northern Rough-winged Swallow						64		**64**
	Bank Swallow						367		**367**
	Cliff Swallow						32		**32**
	Barn Swallow			5					**5**
	Rock Wren						1		**1**
	Marsh Wren	1					1		**2**
	American Pipit	63	103	399				17	**582**
	Sage Sparrow			1					**1**
	Savannah Sparrow			19			14		**33**
	Red-winged Blackbird			3			6		**9**
	Yellow-headed Blackbird			1			10		**11**
	Brown-headed Cowbird					1	13		**14**
Perching Bird Total		**212**	**103**	**454**	**51**	**144**	**821**	**18**	**1803**

4.6. Gulls and Terns

Use of the Project area by gulls and terns has also increased in response to shallow flooding. Several species have been encountered during spring and fall migration. The most notable response has been the tremendous increase in use by California Gulls, primarily during summer.

4.6.1 California Gull

The California Gull is a colonially-nesting species that breeds in scattered locations throughout the arid western United States. The large majority of birds abandon their inland nesting sites in the fall, traveling west and south to winter along the Pacific coast. The number of California Gulls using Owens Lake has increased dramatically in response to the implementation of DCMs. The southernmost breeding locality is noted as Mono Lake (Winkler 1996); however, a small nesting colony was noted in 2002 at Laurel Pond, Mono County – a location approximately 47 km southeast of Mono Lake (Ms. Debbie House, personal observation). Additionally, California Gulls have been nesting in the Project area since 2004, but with apparent limited success. The nesting by California Gull at Owens Lake thus represents a southward expansion of almost 200 km of known breeding sites by this species. California Gull are substantial predators of bird nests at some, but not all locales. Page, Stenzel and Ribic (1985) found that predation by California Gulls was the primary reason for nest failure of Snowy Plovers at Mono Lake. The California Gull is one of the focal species of this plan due to its response to the Project, and its potential to affect Snowy Plovers.

Habitat Requirements

California Gull require open habitats for nesting and foraging. This species nests colonially at large interior freshwater or saline lakes. Colonies are generally located on islands or islets which offer some protection from terrestrial predators, but are also nesting along roads and levees at salt-evaporation ponds. Like most other gull species, California Gull forage opportunistically. Prey items range from the size of brine shrimp up to the largest thing that will fit down its throat. At saline lakes, California Gull are often seen feeding on alkali flies, often by walking or running through a swarm of flies with bill agape. This species eats the young and eggs of other birds, including its own kind, carrion, trash, small rodents, etc. Individuals may range far from the colony to forage, depending upon the distribution and abundance of prey items.

Life History

California Gull migrate between nesting locations at inland sites in the western United States and wintering sites along the Pacific coast. California Gulls are a “four-year gull”, that is they do not obtain full breeding plumage until their fourth year after hatching. Although birds may be sexually mature in their third year, the majority of birds do not attempt breeding until four years of age. Breeding age birds return to nesting grounds generally in March or April (or 3-7 weeks before egg-laying), while the majority of non-breeding birds remain on the coast. Birds nest colonially with nests as close as 1-3 m apart. Birds defend only their nesting territory or the area around their nest in a colony. Only one clutch is raised per year. Birds will lay a replacement clutch only if eggs are destroyed early in the breeding season of if eggs are destroyed less than 3 weeks after laying. A clutch size of 2 or 3 eggs is most common. Incubation is completed by both adults and the incubation period is 23-27 days. Young stay in the nest the first three days, and then remain in close proximity to the nest territory until capable of flight at 45-48 days. Juvenile birds are at or near adult size at fledging. Both parents tend to young, feeding young until fledging. During foraging bouts, adult birds swallow food items and upon return to the young, regurgitate food items in response to food-begging calls or bill-pecking by the young. The diet of young birds and adults has been found to be similar. Young begin leaving the colony 1-2 weeks after fledging and move toward coastal wintering areas, while adults remain on the breeding grounds for 4-6 weeks before returning to the coast.

Population Size

The first standardized count of gulls at Owens Lake was done in 2005 by PRBO in response to a noticeable increase in the number of gulls present at the lake. Since 2005, California Gull numbers have been recorded concurrent with the lake-wide Snowy Plover surveys during the 5-7 day census in late May of each year. Data for 2002-2004 was derived by PRBO from previous PRBO bird surveys as well as information provided by Eastern Sierra Audubon Society and represents a best guess estimate of the number of gulls using Owens Lake during late May.

A review of Table 10 shows a dramatic increase in the number of gulls using Owens Lake since the initiation of shallow flooding. This increase in gull numbers can be explained by the increase in use of shallow flood area Project components. The most dramatic increase occurred in 2005; in subsequent years gull numbers have remained relatively stable. This increase of gulls for 2005 corresponds to the first operation of Phase 4 shallow flood ponds. Interestingly, the gulls counted were not found in these ponds located in the Central region. Most observations occurred in the North region. The large amount of ponded water may have served to attract them as they migrated above but may not have provided sufficient food resources to sustain them given they were recently created. Apparently, individuals moved to the north part of the Lake (and a small number south) to more mature areas with a more developed invertebrate community. Since 2005 gulls have been found in large numbers in those the more recently flooded Phase 4 ponds as well as Phase 5 ponds.

Table 11. Number of Gulls Present at the Owens Lake Late May 2002-2009

			Year					
Region	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
North	87	128	560	6270	4647	4874	4590	5048
South	0	0	0	890	353	370	949	970
West Shore	11	77	5	0	28	0	1	12
Central	*5	*3	*220	0	53	3163	2286	2665
Total	**103**	**208**	**785**	**7160**	**5081**	**8407**	**7826**	**8695**

**number represents Zones 3/4*

Use of Project Area

California Gull have responded positively to shallow-flood components of the Project. The Project site offers abundant food resources and open habitats preferred by California Gull for foraging and nesting. The number of gulls at Owens Lake increased dramatically after 2005. The distribution of gulls in the Project area has varied over time. The number of gulls in the North Region has been consistently high, although distribution within this large area has varied. The number of gulls in T36 was higher in 2008 than previous years. Table 11 shows the number of individual gulls recorded in each DCM cell the last two years.

Table 12. Gulls Observed in the Project Area During Lake-Wide Surveys

DCM/Area	Year			
	2007		2008	
	Gulls	*% of total*	Gulls	*% of total*
T1-1	6	*0.1%*		
T2-1	119	*1.4%*		
T2-2	1	*0.0%*		
T2-3				
T2-4	3	*0.0%*	2	*0.0%*
T2-5				
T3NE			16	*0.2%*
T3SE		*0.0%*	90	*1.2%*
T3SW			247	*3.3%*
T4-3	241	*2.9%*	7	*0.1%*
T4-3 Addition				
T4-4			116	*1.6%*
T4-5				
T5-1			14	*0.2%*
T5-2				
T5-3				
T5-4			16	*0.2%*
T8W				
T9	32	*0.4%*	75	*1.0%*
T11	124	*1.5%*	575	*7.8%*
T13-1			338	*4.6%*
T13-2			127	*1.7%*
T13-3			606	*8.2%*
T18N	1212	*14.4%*	94	*1.3%*
T18S	1794	*21.3%*	471	*6.4%*
T23NE	623	*7.4%*	17	*0.2%*
T23NW	274	*3.3%*	6	*0.1%*
T23SE	640	*7.6%*	97	*1.3%*
T23SW	563	*6.7%*	136	*1.8%*
T24	520	*6.2%*	91	*1.2%*
T25N	294	*3.5%*	4	*0.1%*

Table 12. Continued, Gulls Observed in the Project Area

DCM/Area	**Year**			
	2007		**2008**	
	Gulls	***% of total***	**Gulls**	***% of total***
T25S	209	*2.5%*	86	*1.2%*
T26	339	*4.0%*	75	*1.0%*
T27 Addition				
T27N	76	*0.9%*	244	*3.3%*
T27S	192	*2.3%*	82	*1.1%*
T28N	1	*0.0%*	106	*1.4%*
T28S	97	*1.2%*	5	*0.1%*
T29-1			99	*1.3%*
T29-2	901	*10.7%*	78	*1.1%*
T29-3			744	*10.1%*
T29-4			98	*1.3%*
T30-1			223	*3.0%*
T30-2			83	*1.1%*
T30-3				
T35-1	145	*1.7%*	47	*0.6%*
T35-2			273	*3.7%*
T36-1			278	*3.8%*
T36-2			1474	*20.0%*
T36-3			241	*3.3%*

California Gulls have nested in the Project area since at least 2004, when a few nests were seen during plover surveys. In 2006, a total of 56 nests were seen, with 34 of these nests in four separate areas in the T3 area, and 22 nests on an island in the T18S Shallow Flood cell. The total number of nests present in 2007 was not counted, however PRBO reported that on May 23, 2007, during Snowy Plover surveys in cells T18S and T18N, 3000 gulls were present with hundreds of gulls sitting on nests on islands within these cells. During a follow-up visit on June 9, no active gull nests were seen and only about 100 gulls remained in the area. In 2008, 174 active gull nests were counted during the Snowy Plover survey. Nesting areas were scattered among 12 shallow flood cells. Despite repeated nesting attempts by California Gulls, few nestlings have been observed. The only documentation of an egg surviving to hatching is that of a gull chick seen and photographed by Mr. Ray Ramirez (LADWP) on July 6, 2007 in T18N. The age of the chick is uncertain; however it appeared to still be quite young and downy, and was seen being shaded by an adult. It is not known if California Gulls have successfully fledged any young from Owens Lake since 2004.

Predation is believed to be the predominant cause of most nest failures of gulls in the Dust Control Project area. While the Project area appears to provide abundant food resources and open habitat suitable for nesting, site conditions offer little in the way of protection from terrestrial predators. Gull nests have been seen along the edges of berms and roads, while others are on small islands (such as in T18 cells). Water depth in shallow flood cells is unlikely to prevent terrestrial predators such as coyotes from accessing the islands.

PRBO has expressed concern over the establishment of a large gull colony at Owens Lake and its potential effect on nesting Snowy Plover and American Avocet, as the gulls are predators of shorebird eggs and chicks. However, American Avocets numbers have been higher than found before the large gull increase. Snowy Plover abundance has also been higher than before gull numbers increased, except for the decrease in 2007 discussed earlier (due to the cold winter).

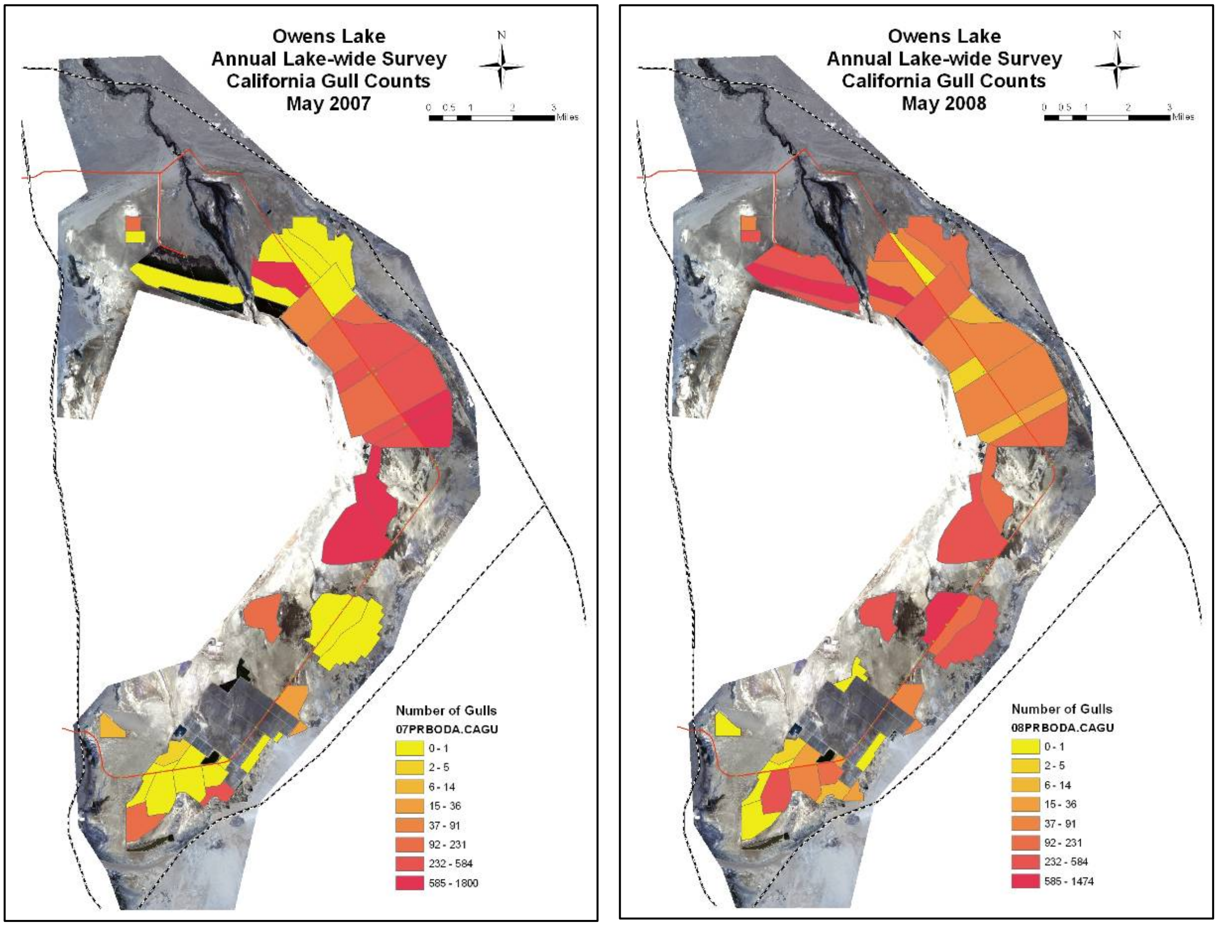


Figure 14. Distribution of Gull During the Annual Lake-Wide Survey

4.7. Perching Birds

Perching birds are a small component of the avifauna using the Project area. The most frequently encountered species year-round are Horned Lark and Common Ravens. Flocks of American Pipit can be encountered during winter and in migration. Swallows and swifts forage over the dust control ponds during spring and fall migration. Marsh Wrens have nested in some vegetated areas. The Common Raven is the only passerine species of management concern, and will be discussed in detail below.

4.7.1 Common Raven

The Common Raven is another cosmopolitan species native to Owens Valley and the west. Since the 1960's, Common Raven populations have increased throughout much of its range in North America (Boarman and Heinrich 1999). Common Raven are able to adapt to and take advantage of human-altered habitats and food resources, and these factors have contributed to increased abundance. The Common Raven is a known predator of Snowy Plover eggs and chicks, and eggs and chicks of other shorebirds. Due to concern regarding the potential increase in Common Raven at Owens Lake as a result of increased human activity and infrastructure associated with the Project, a Corvid Management Plan became a requirement under Measure Biology-13 of the 2003 SIP. The Common Raven is the most abundant corvid species that occurs on the lake and in the Project vicinity, and therefore mitigation measures were developed to prevent an increase in the use of the lake of this species due to construction, maintenance, and operational activities associated with DCMs.

Habitat Requirements

The Common Raven is a large, formidable, and adaptive bird that occupies a range of habitats in North America from the northern tundra to the southern deserts. This species is found in both forested and open natural communities but has also adapted to human disturbance, particularly agricultural development. Raven abundance and distribution has increased and expanded in some areas largely due to landscape changes and the introduction of crucial food, water, and structural resources that were not previously available.

Ravens are opportunistic omnivores and are successful scavengers consuming road kill, agricultural fruits and grains, as well as organic material from landfills. They may travel long distances between their territories and roost sites to visit human subsidized food resources. Ravens are also adept predators preying upon a variety of wildlife including shorebird eggs and young. Ravens are also known to patrol highways in search of road kill.

Life History

Common Ravens is a resident at Owens Lake. Breeding pairs form long-term bonds and defend territories year-round. Common Raven will travel beyond those territories throughout their home range in search of food. Territory sizes have been found to range from 1.2 to 40.5 square kilometers. Both territories and home ranges are highly variable and dependent on the abundance of local resources. Juvenile or otherwise non-paired birds rely on a home range for foraging and often return to communal roosts. Roost sites are typically located in trees, cliffs, or man-made structures. Generally, the number of birds roosting at an individual site is dependent on the abundance of local food resources. Paired and juvenile birds can be found together at unique sites with abundant food resources, though pairs typically roost in their territory.

Common Raven pairs will vigorously defend their territories during the breeding season. The raven breeding season begins in early to late winter with the onset of nest site establishment and nest building. Nest sites are typically located on cliffs and trees and elevated structures such as utility poles/towers and abandoned structures and are often used in successive years. Three to seven eggs are laid in early March to mid-April. Chicks hatch after 20 to 25 days and typically fledge by mid-June, at five to seven weeks of age. Chicks and fledglings are susceptible to predators such as large raptors and other ravens.

Population Size – Lake-wide Surveys

Under the Corvid Management Plan monitoring program, an annual one-day census of Common Ravens within the Project area and vicinity has been conducted since 2004. Common Raven nest sites within the Project area and vicinity have also been documented as part of the Corvid Management Plan (Figure 15). The number of ravens counted on the lake has varied from 79 birds to 190 birds based on the directed annual surveys (Table 12). The Project has increased the food and water resources available to ravens but has not increased nest site availability. No comparable pre-project data exists regarding lake-wide Common Raven numbers. Therefore it is not known if the number of Common Ravens using the lake has increased above pre-project levels. There has been no discernable trend in the number of ravens counted at the lake since lakewide surveys began in 2004 (Table 12).

Table 13. Results of Annual Lake-Wide Common Raven Survey (2004-2009)

		Year					
Region		2004	2005	2006	2007	2008	2009
Central	Non-project	5	2	1	58	2	4
	Project	0	0	1	1	3	2
Central Subtotal		**5**	**2**	**2**	**59**	**5**	**6**
North	Non-project	3	1	0	0	2	0
	Project	81	54	134	94	26	72
North Subtotal		**84**	**55**	**134**	**94**	**28**	**72**
South	Non-project	2	5	4	5	6	11
	Project	9	1	2	18	22	32
South Subtotal		**11**	**6**	**6**	**23**	**28**	**43**
West Shore	Non-project	22	16	28	14	18	5
West Shore Subtotal		**22**	**16**	**28**	**14**	**18**	**5**
Total		**122**	**79**	**170**	**190**	**79**	**126**

Use of Project Area

Table 13 shows the distribution of ravens at Owens Lake during the lake-wide corvid surveys in 2007 and 2008. Common Raven use both DCM areas and lake-fringing seep and spring areas (non-project areas). The proportional use of Project areas vs. non-project areas has been similar the last two years. In 2007, approximately 60% of all ravens were in the Project area, while in 2008 approximately 65% were detected in the Project area. Page (2007) reports little overlap in the distribution of adult plovers during the nesting season, and raven activity. The Corvid Management Plan appears to be effective in that ravens are only rarely seen using Project-related infrastructure for perching. Nesting opportunities for Common Raven are extremely limited within the Project area. Figure 15 shows all Common Raven nests found from 2004 through 2008. The number of nests documented during any one year has ranged from five to 29. Only one nest has occurred within the Project boundary. This nest was located on abandoned mining equipment on the playa in what is now cell T18S. The last time this nest was used was 2006. Nests have primarily been outside the Project boundaries on powerline towers or under railroad trestles of the abandoned narrow gauge railway along the west shore. Several nest sites have been used multiple years.

Table 14. Distribution of Common Raven During Lake-Wide Surveys (2007-2008)

DCM/Area	Year			
	2007		2008	
	# of ravens	*% of total*	# of ravens	*% of total*
T1-1				
T2-1				
T2-2				
T2-3				
T2-4				
T2-5				
T3NE				
T3SE	2	*1.1%*		
T3SW				
T4-3			4	*5.1%*
T4-3 Addition			17	*21.5%*
T4-3/4-4				
T4-4				
T4-5				
T5-1				
T5-2				
T5-3	4	*2.1%*		*0.0%*
T5-3 Addition				
T5-4				
T8W				
T9				
T11				
T13-1			2	*2.5%*
T13-2			1	*1.3%*
T13-3				
T18N	1	*0.5%*		
T18N Addition				
T18S				
T23NE				

Table 14. Continued, Distribution of Common Raven

DCM/Area	Year			
	2007		2008	
	# of ravens	% of total	# of ravens	% of total
T23NW				
T23S				
T23SE	3	1.6%		
T23SW	1	0.5%	2	2.5%
T24			1	1.3%
T25N	4	2.1%		
T25S				
T26	20	10.5%	2	2.5%
T27 Addition				
T27N	4	2.1%		
T27S	4	2.1%	2	2.5%
T28-4				
T28N	17	8.9%	13	16.5%
T28S	16	8.4%	1	1.3%
T29-1	9	4.7%	1	1.3%
T29-2	4	2.1%		
T29-3	1	0.5%		
T29-4				
T30-1	8	4.2%	2	2.5%
T30-2	1	0.5%		
T30-3				
T35-1				
T35-2	2	1.1%		
T36-1			2	2.5%
T36-2				
T36-3				
Managed Vegetation	12	6.3%	1	1.3%
Non-Project Areas				
Bartlett/Carroll Creek	2	1.1%	6	7.6%
Cartago Creek	2	1.1%	5	6.3%
Dirty Socks Duck Club	1	0.5%		
Dirty Socks			1	1.3%
North Cottonwood	6	3.2%	8	10.1%
Northwest Seep	2	1.1%	2	2.5%
Olancha Pond	2	1.1%		
Owens River Delta			2	2.5%
Permanente/Ash Creek	1	0.5%	1	1.3%
South Cottonwood	3	1.6%	1	1.3%
Sulfate Well	28	14.7%		
Swede's Pasture Spring	23	12.1%	2	2.5%
Tubman springs	5	2.6%		
Whiskey Creek	2	1.1%		
Total	190		79	

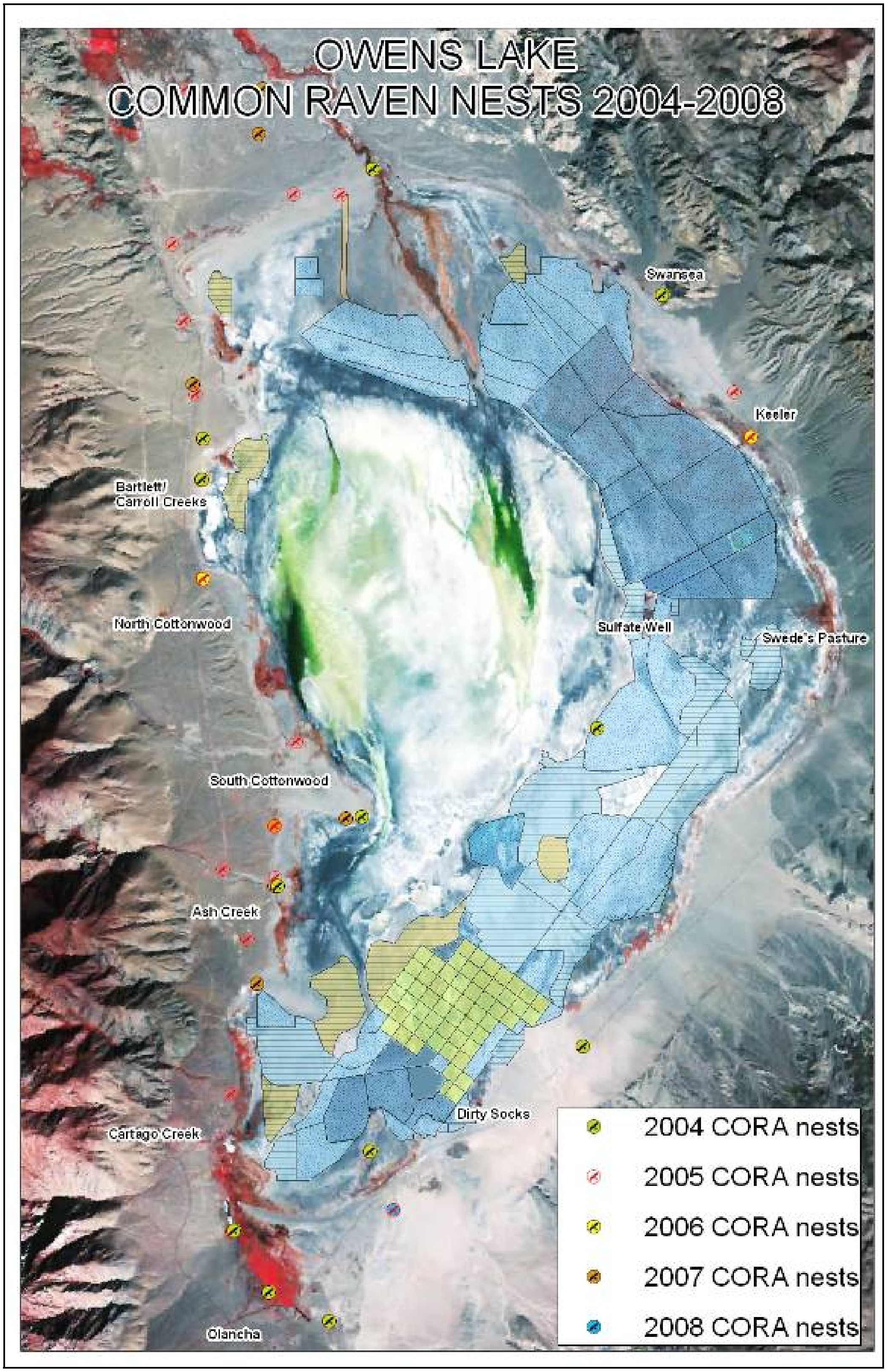


Figure 15. Common Raven Nests Adjacent to Owens Lake 2004-2008

4.8. Exposure of Wildlife to Environmental Toxins

The Owens Valley last spilled water outside of the basin via natural streams over 10,000 years ago. Since then drainage has terminated at Owens Lake. Owens Lake has thus long been an environment where elements weathered from the entire Owens watershed would concentrate. Wildlife living or stopping at the Lake have endured the high levels of salinity and specific element concentrations in Owens waters and some have thrived. The construction of large-scale dust control has not change this ecology.

The approach to ecological risk on Owens Lake is to monitor changes and develop contingencies. Presumptions based on theory and chemistry were avoided in favor of monitoring and assessment. Monitoring can be changed, reduced, or continued based on results and assessment. This understanding and approach are embodied in the Project waste discharge requirements and related documents.

Ecological toxicity monitoring and risk screening analysis has been conducted on Owens Lake since 2001 in order to assess potential contamination risk to wildlife species. The assessment has consisted of sampling water, sediment, invertebrates, nonviable bird eggs, and, when possible, salvaged water birds for various constituents. These data are evaluated to determine their exceedances with respect to ecological toxicology screening values.

Results indicated that some trace elements show exceedances of ecological screening values for water, sediment, and dietary items. The most consistent problem elements and the highest in exceedence of screening values were arsenic, boron, and barium. However, with the exception of barium these elements did not show up in elevated concentrations in Snowy Plover or American Avocet eggs. No effects of barium toxicity were observed in embryos. There have also been isolated screening level exceedances in eggs for lead and mercury in collected eggs.

In 2003 one Bonaparte’s Gull, 18 additional gulls that were identified as Ring-billed Gull (mostly juvenile), and one American Avocet carcass were observed and collected. No definitive cause of death was found but all birds had high parasite loads. Gulls had elevated brain sodium compared to Ruddy Duck captured in freshwater but lower than other thresholds. Some waterbirds showed elevated mercury, selenium, cadmium, or other metals relative to screening levels.

There were no dead birds observed or collected in the North Sand Sheet (NSS) during 2005. The screening results in 2005, for aquatic invertebrates indicate elevated levels of barium, boron, copper, selenium, vanadium, and zinc. No samples showed arsenic concentration above screening levels. In the NSS egg concentrations were generally lower for most inorganic contaminants in 2005 compared to previous years sampling. Although some trace element levels in eggs were elevated above background levels, the concentrations found in eggs at Owens Lake indicate a low-level risk of avian reproductive effects, and no constituent effects were observed in embryos collected during 2005.

The concentrations of arsenic, barium, boron, and selenium in water and sediment were significantly related to overall salinity. These relationships suggest that sites managed for higher salinity at Owens Lake are likely to result in higher concentrations of these inorganic constituents (CH2MHILL 2005).

In 2008, some constituents were elevated above eco-risk screening levels in most media for a majority of the sites sampled (i.e., aluminum, arsenic, barium, boron, chromium, copper, and zinc).

In 2008, on a site-by-site basis constituents that were correlated between abiotic (water or sediment) and biotic (invertebrate) media include aluminum, boron, and zinc. This helps determine the likelihood that these constituents might pose a risk to avian fauna that inhabit and feed in these habitats throughout the Owens Lake playa.

Comparisons between constituent levels between years within commonly sampled media showed that many constituents were lower in flooded habitats in 2008 than in 2005. However, spatial variation across the playa needs to be considered. The 2008 data also indicate that certain constituents have increased in flooded habitats within the Project. Examples of elements that were higher in 2008 compared to 2005 were zinc in insect and sediment samples, and arsenic, lead, and mercury in sediments.

The lack of dead birds to necropsy, and high plover nest success rates in 2000-2003, suggest that contaminant concentrations are not high enough to kill birds or compromise nesting success. Only a subset of locations in shallow flood has been sampled. However, most areas with the potential for the highest salinity levels and therefore the most likely to accumulate constituents have been sampled, with no apparent toxicity.

4.9. Variables Important for Waterfowl and Shorebird Use

The salinity regime is one of the most important factors that determine invertebrate habitat suitability, as discussed earlier. To further understand how salinity (and its impact on foraging resources) influences migratory waterbird use, the salinity of shallow flood cells was sampled in conjunction with a lake-wide bird count. In April 2009 after the Spring Big Day bird count, specific conductivity was measured in the majority of DCM cells. Two days previous to the Big Day bird survey an image of shallow flood was captured and used to assess the acreage of ponded water. For an example of the distribution of ponded water from an image taken at a different date see the dark blue areas in Figure 25 of Section 6 Resource Management Actions. Exploratory data analysis was conducted whereby non-parametric correlations between both waterfowl and shorebird abundance, density, and species richness were evaluated with respect to specific conductivity as well and proportion and acreage of ponded water. The results are summarized below.

Waterfowl abundance by cell was negatively correlated with water salinity (r_s= -.36, p=0.04, n=33). The highest numbers of waterfowl were found in cells with the lowest salinity. Waterfowl were particularly abundant in the northern part of Owens Lake with the highest abundance in the shallow flood cell with created wetlands (T30-1) which has the highest vegetative cover. The other two cells with waterfowl numbers above 1000 were T30-2 and T29-2. Waterfowl abundance by cell was not correlated with standing water acreage within a cell (r_s= 0.32, p=0.08, n=33). The acreage of ponded water within a cell, while not significant appears to explain about 10% of the variation of waterfowl abundance within a shallow flood cell. Warnock et al. (2002) found a tendency of larger salt ponds in the San Francisco Bay to support larger number of birds and a higher diversity of species. Warnock et al. (2002) found pond size was not significantly related to numbers of dabbling or diving ducks. Further research was suggested into this relationship.

There were 11 shallow flood cells with high shorebird use (greater than 1000 individuals). There was no linear relationship between salinity and shorebird abundance (r_s= -.13, p=0.47, n=33). There appears to be a stronger nonlinear relationship between salinity and shorebird abundance (Figure 16). This relationship describes 12% of the variation seen in shorebird abundance by cell. There appears to be a pronounced peak in shorebird abundance in cells with salinity in the 60-80 mS/cm range with several cells in this range supporting more than 1000 shorebirds. More than 1000 shorebirds were seen in one hypersaline cell (>100 mS/cm) (T24).

The majority of shorebirds observed were Least and Western Sandpiper and American Avocet, followed by Black-necked Stilt, Dunlin, and dowitchers (*Limnodromus* spp.). The majority of the cells supporting more than 1000 shorebirds during the count were sheet flow shallow flood cells. More than 1000 shorebirds were observed in seven of the twelve original (Phase 1 north) sheet flow cells which have the highest proportion of productive shallow water habitat; there were only two pond shallow flood cells that had high shorebird abundance. It should be noted that the cell with the highest abundance of shorebirds during this day was T36-2, a pond shallow flood cell which was observed qualitatively to have the highest abundance of planktonic invertebrates in the water column during water quality sampling. The other two cells with shorebird abundance over 1000 were T29-2 that has some vegetated sheet flow areas and T36-1 that is relatively fresh (8.6 mS/cm during sampling) and has a substantial amount of sheet flow area with recruiting vegetation. These two areas are also close in proximity to the Owens River delta.

Waterfowl species richness (the number of species observed in a cell) was negatively correlated to salinity (r_s= -.35, $p<0.05$, n=33), with more species observed in low salinity cells. Observed shorebird richness was not correlated with measured salinity (r_s= -.29, p=0.1, n=33). Waterfowl richness was also correlated with the amount of ponded water within a cell (r_s= .385, $p<0.05$, n=33). There were more waterfowl species seen in cells with large amounts of ponded water. The average depth of these cells was not measured but based on estimates from digital elevation models the average depth of all ponds was about 1 foot deep with the standard deviation approximately 6 inches.

Density of shorebirds was not correlated with ponded acreage (r_s= .08, p=0.6, n=33). Density of waterfowl was also not correlated with ponded acreage (r_s= .28, p=0.13, n=33). There was no relationship of waterfowl or shorebirds observed per acre to the amount of ponded water in a cell.

It also should be noted that two of the cells with high waterfowl abundance also had high shorebird abundance. These two cells were T30-2 and T29-2. Warnock et al. (2002) also observed dabbling ducks foraging in the same areas as shorebirds, while grebes and other diving birds typically used ponds greater than 2 meters in depth. Colwell and Taft (2000) found that the “likelihood of encountering nearly all shorebirds species increased in shallow wetlands, and these wetlands also supported greater densities of many shorebirds and several dabbling ducks.”

While measuring specific conductivity of tail-water is an efficient way to estimate conductivity in the field, it represents an average in a given shallow flood cell at a given time. Diversity in salinity, particularly in sheet flow cells, which may be an important variable, is not represented by tail-water sampling. Salinity will vary seasonally as well. Also, while salinity is an essential variable due to its effect on the invertebrate community, it is not the only important variable. Other important habitat variables include shallow flood type (sheet flow versus ponds) and vegetation cover and composition as well as the interaction and diversity of these variables.

This waterbird counts represent a one day snap-shot in waterbird use. Overall patterns of use appear similar between years based on observations and a cursory review of other available data. Flocks may move around in response to a variety of environmental variables such as wind, disturbance, and temperature. Seasonal shifts in community composition may also change use patterns of certain cells as some species may prefer certain conditions. For example breeding birds will shift to better nesting habitat as opposed to foraging habitat and fall migrants may prefer other foraging areas.

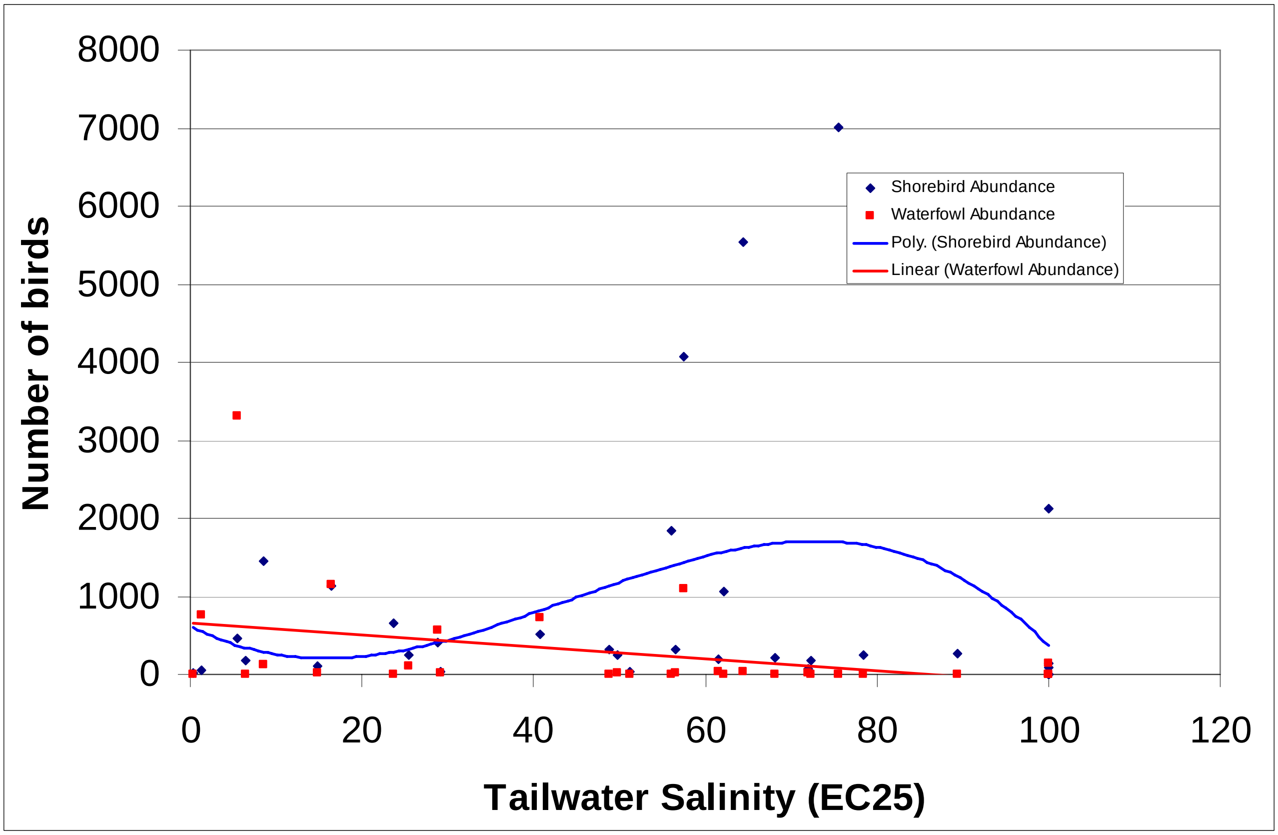


Figure 16. Specific Conductivity of Sampled DCM Cells in Relationship to Waterfowl and Shorebird Abundance April 2009

4.10. Mammals

The response of mammals to implementation of shallow flood is not well known. The pre-project use of playa by mammals was quite limited. The system of roadway and berms that currently exists provides access to areas of playa formerly not accessible. Shallow flooding has attracted large numbers of birds and nesting birds, primarily gulls, avocets, stilts and plovers that provide additional food resources in the form of eggs and young birds. Although no quantitative data exist, it can be presumed that predators of birds or bird eggs such as coyote and other carnivorous mammals such as mink have benefited from the additional resources now available. It has been observed that large numbers of nests of species such as American Avocet and California Gulls are known to disappear within short time periods. Large mammals such as Mule Deer and Tule Elk have not been noted in shallow flood areas. It is unlikely that small mammals such as rodents have benefited much from shallow flood since there has been little overall increase in vegetation cover, however small mammal activity has been noted in some shallow flood cells. The wetland mitigation area in T30-1 may eventually be used by small mammal species including Owens Valley vole and others. The use of shallow flood cells by bat species is also unknown. It is likely that bats forage over the ponds, but the shallow flood project has not created roosting opportunities.

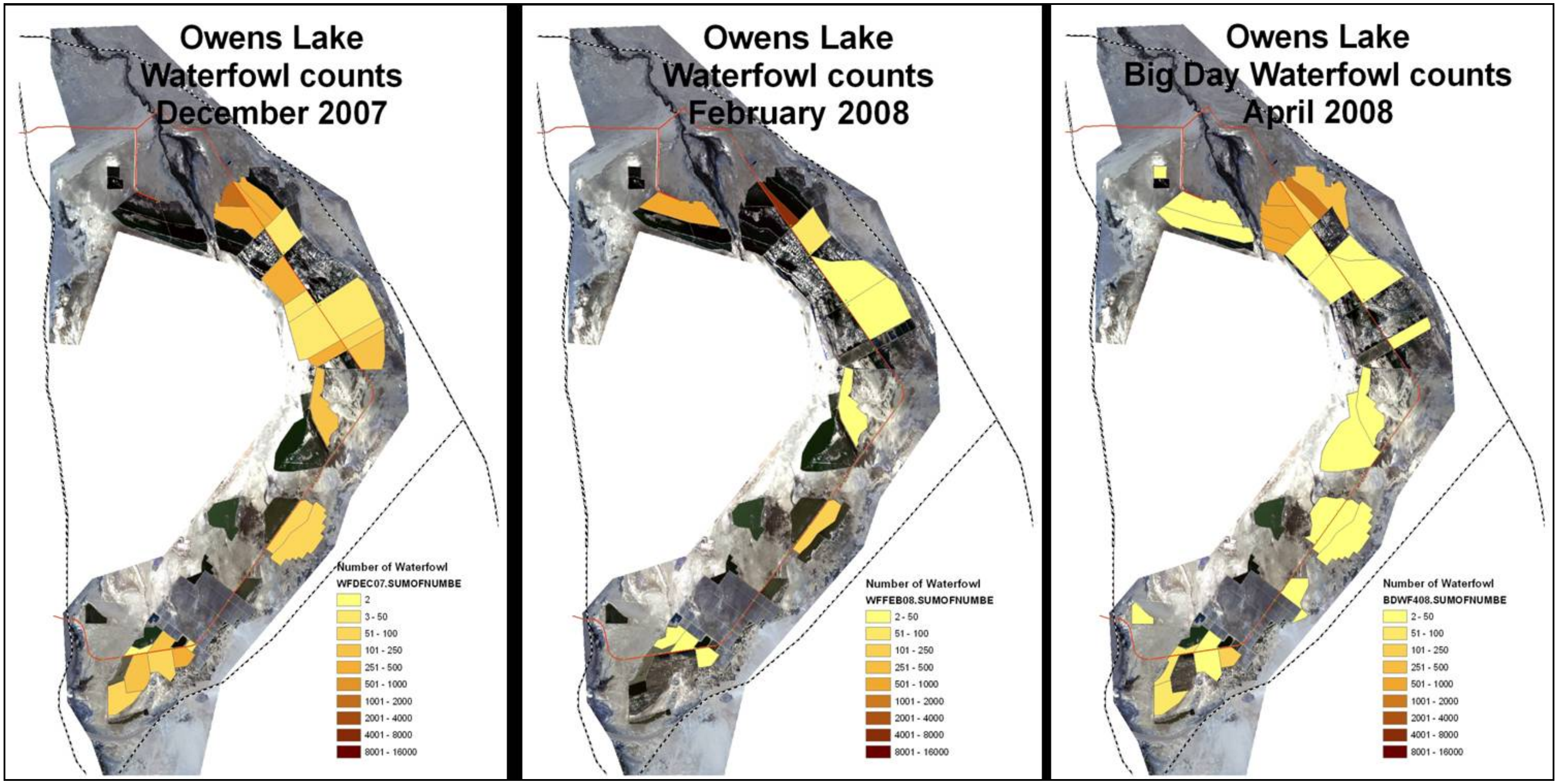


Figure 17. Waterfowl Distribution at Owens Lake in Winter and Spring

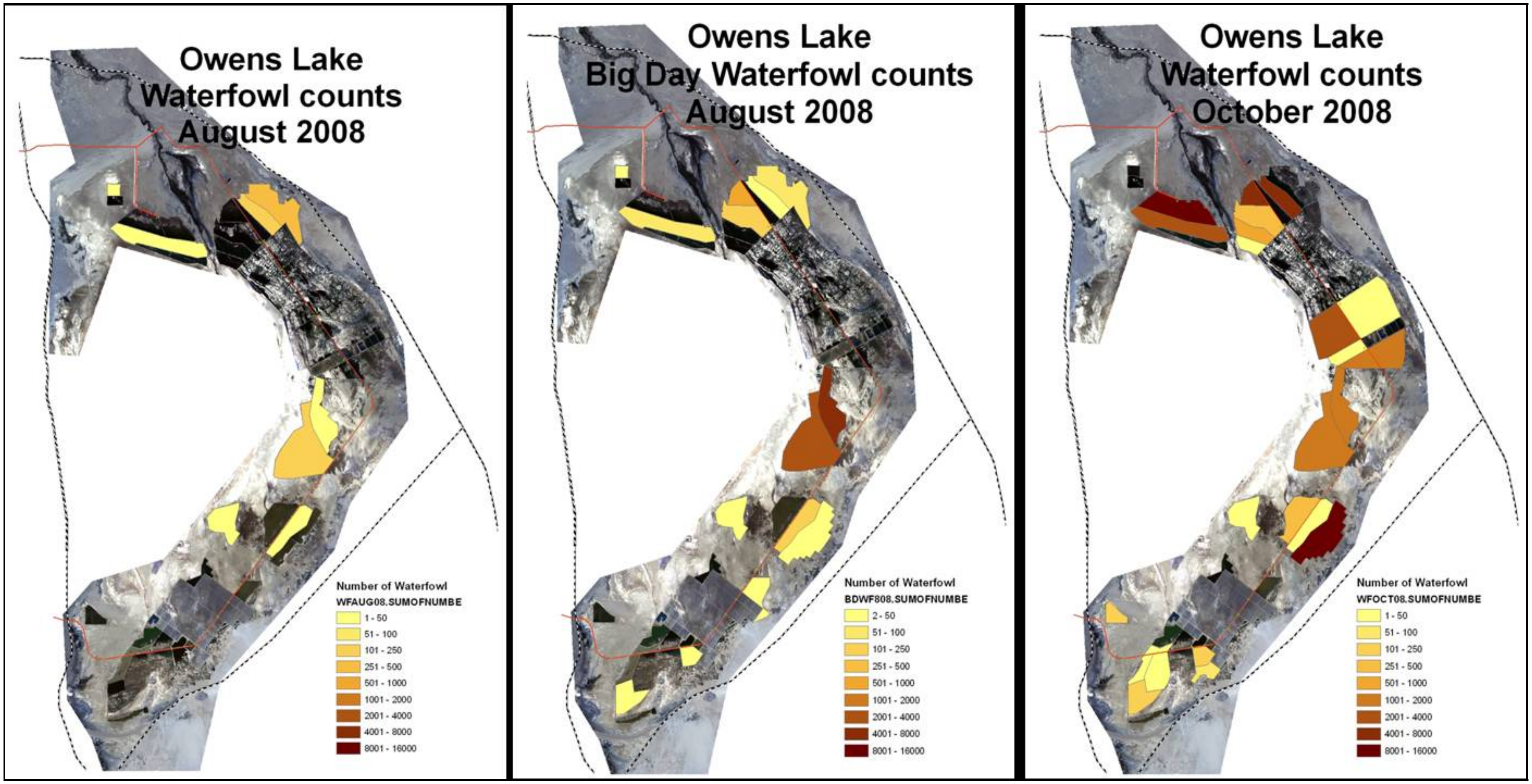


Figure 18. Waterfowl Distribution at Owens Lake in Summer and Fall

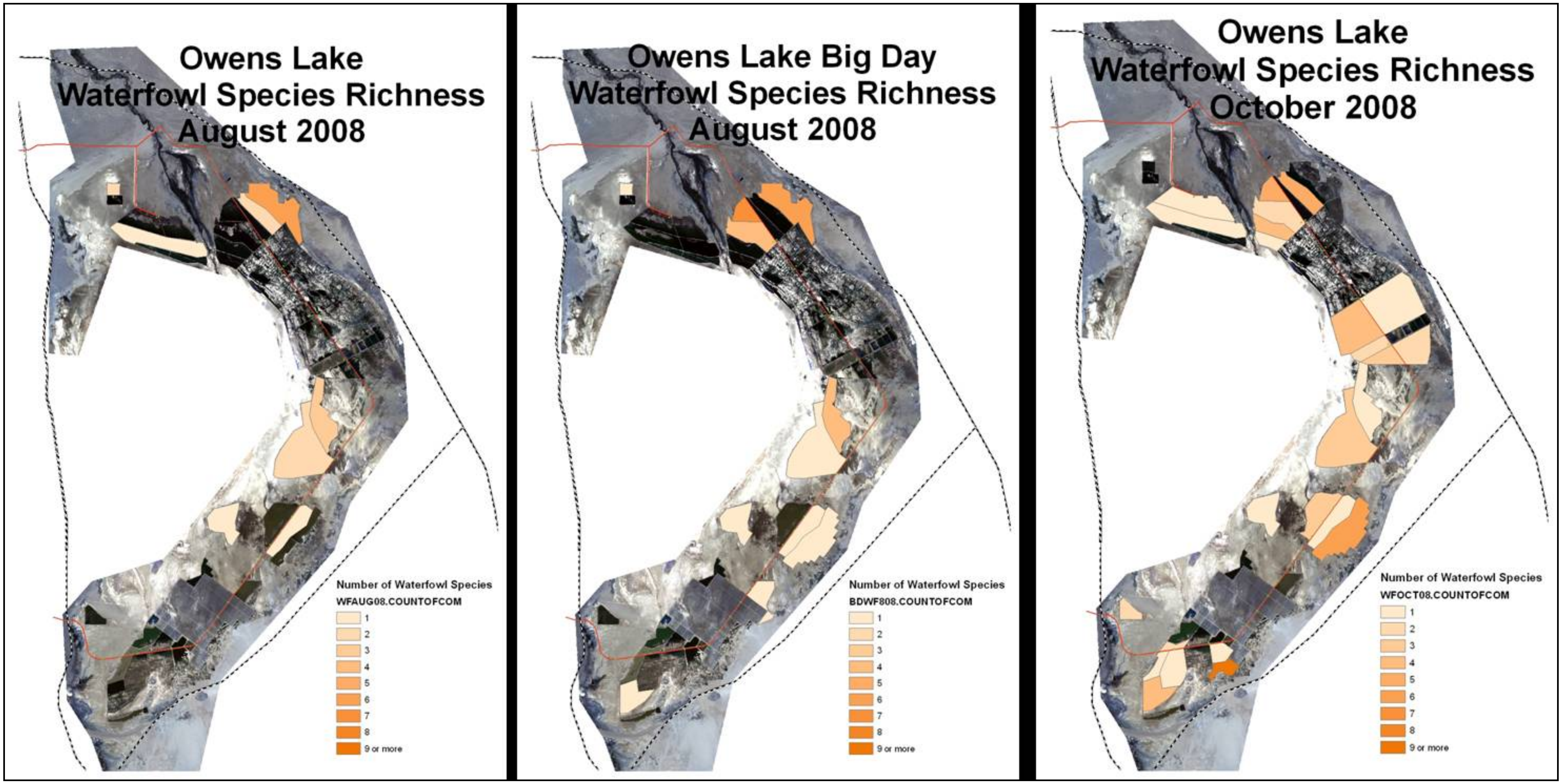


Figure 19. Waterfowl Species Richness at Owens Lake in Summer and Fall

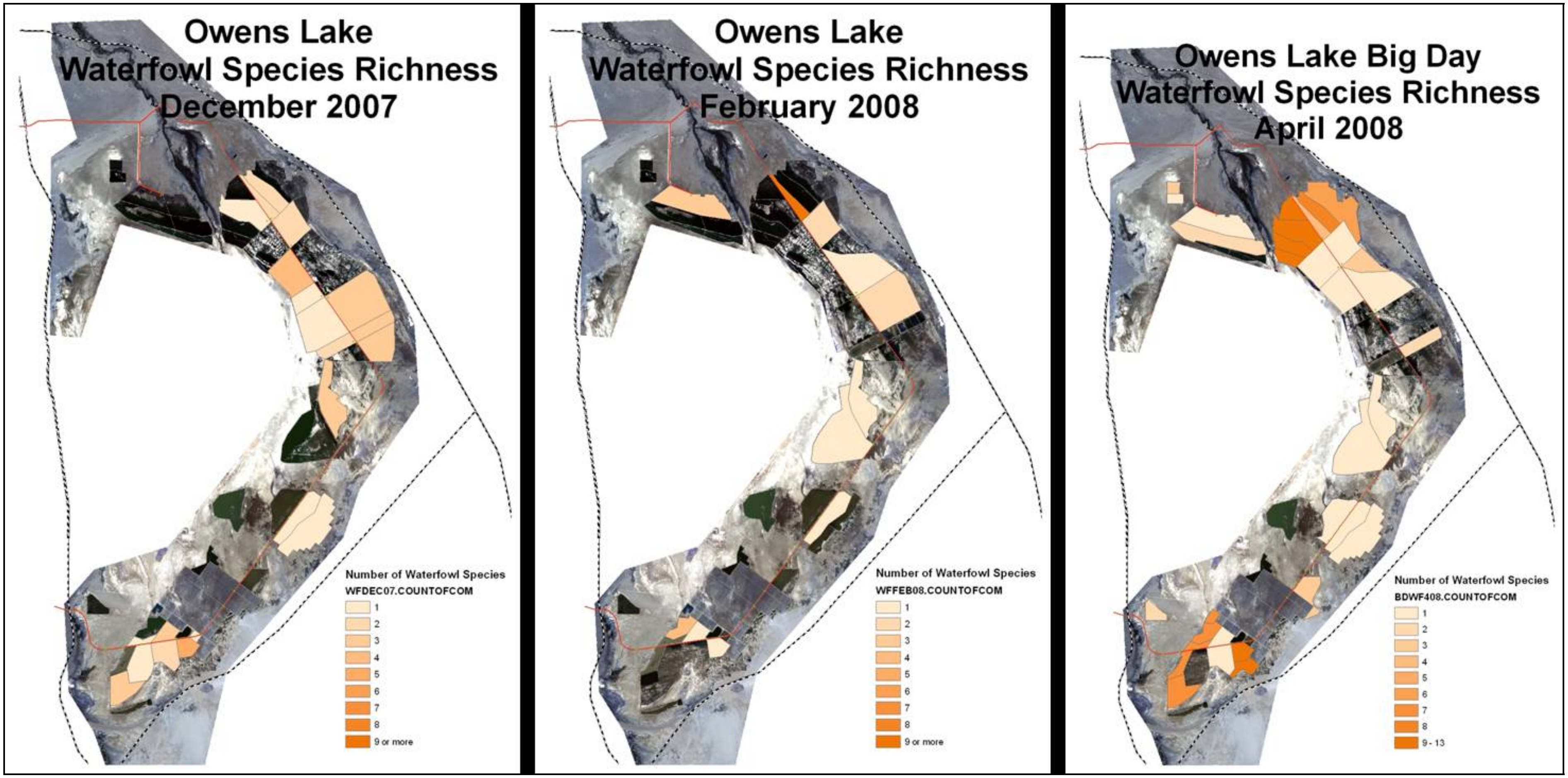


Figure 20. Waterfowl Species Richness at Owens Lake in Winter and Spring

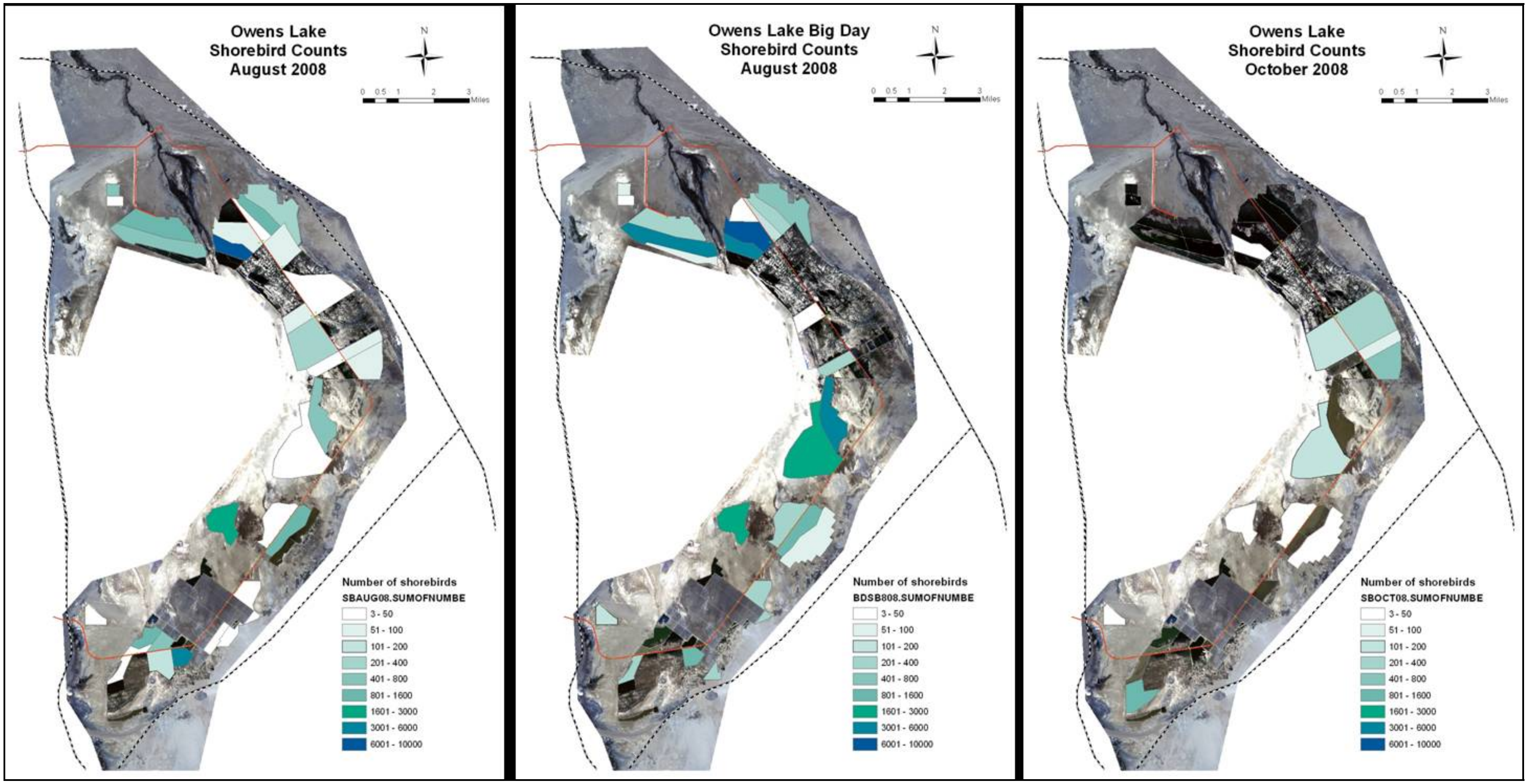


Figure 21. Shorebird Distribution on Owens Lake in Summer and Fall

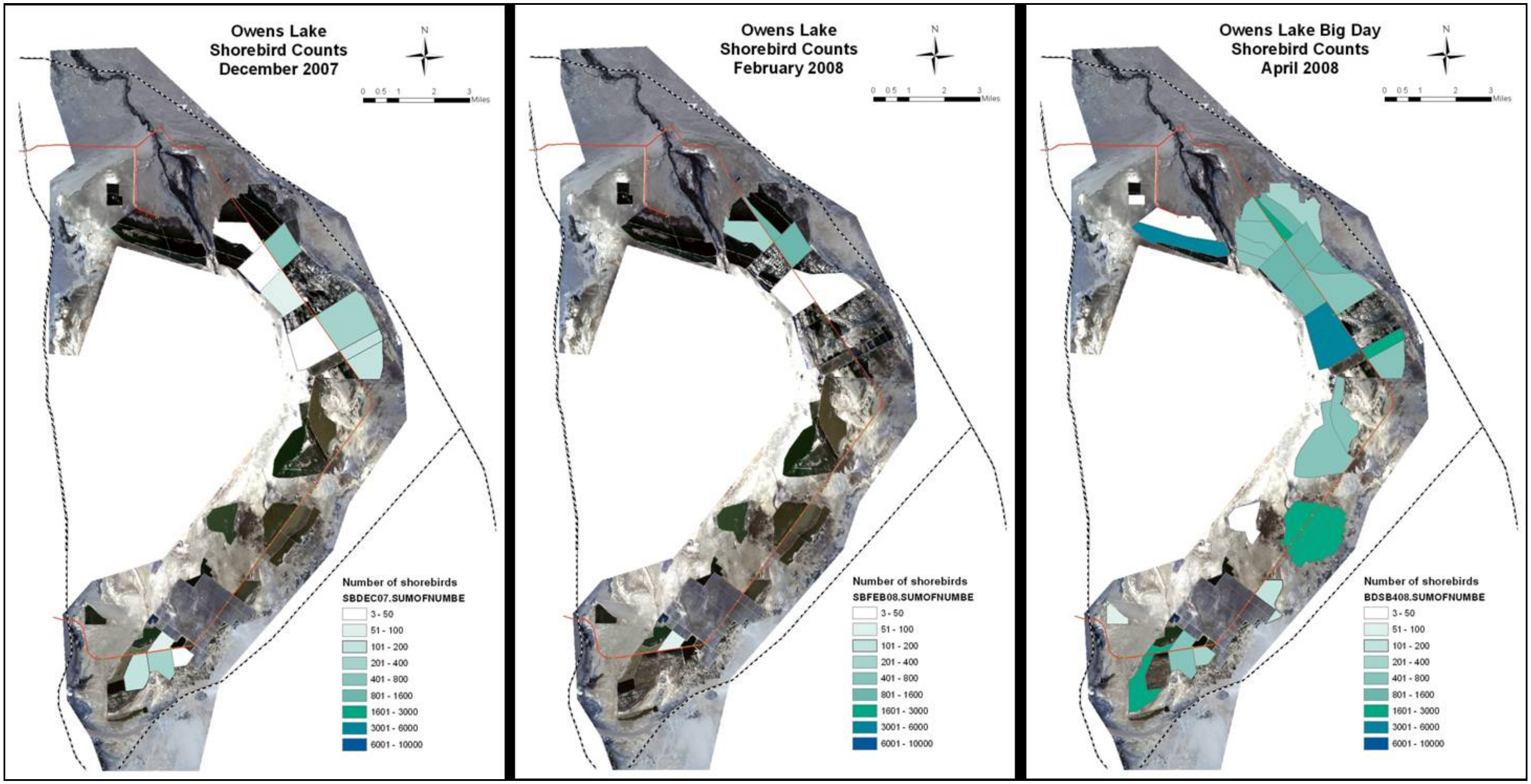


Figure 22. Shorebird Distribution on Owens Lake in Winter and Spring

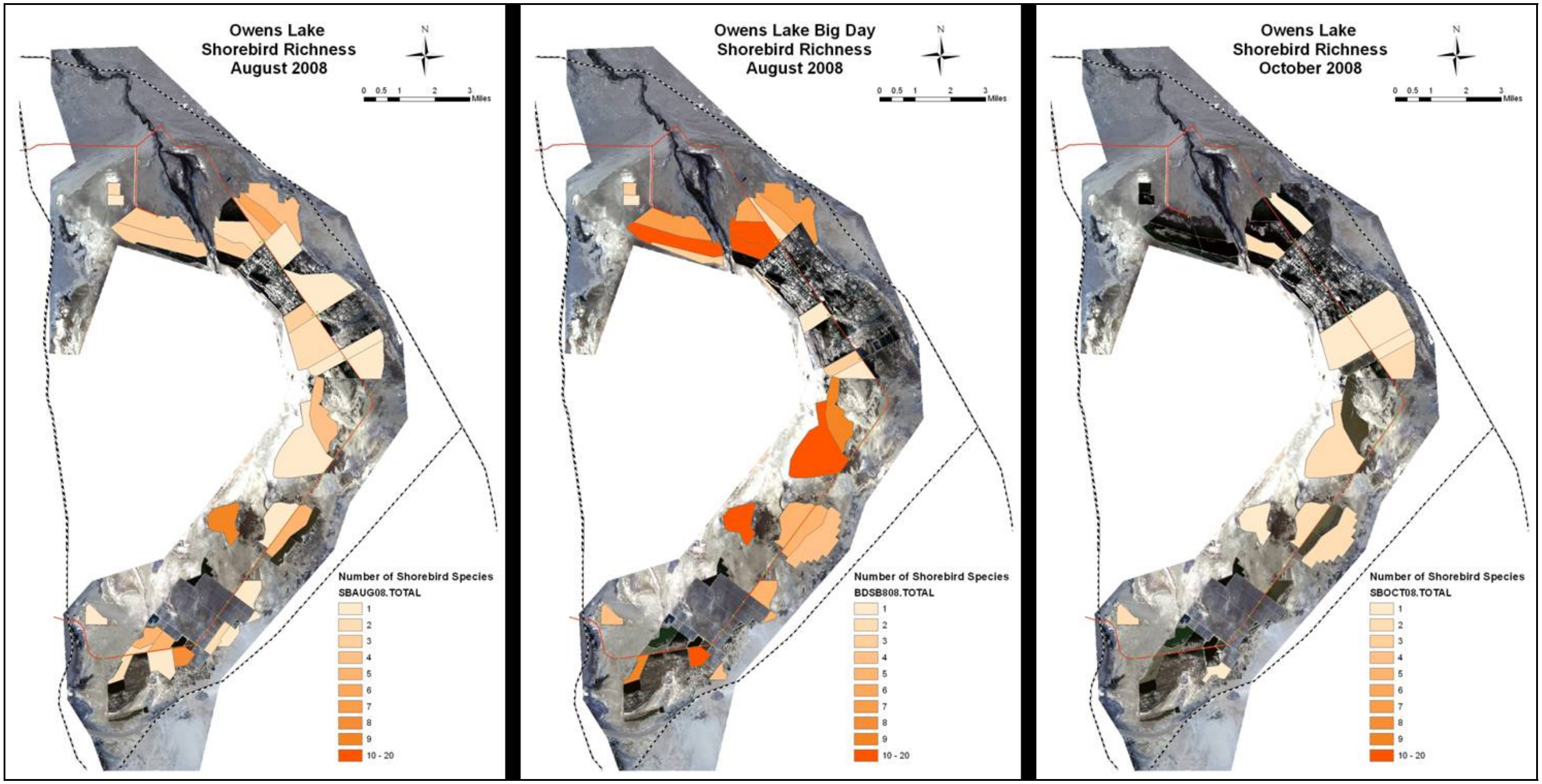


Figure 23. Shorebird Species Richness at Owens Lake in Summer and Fall

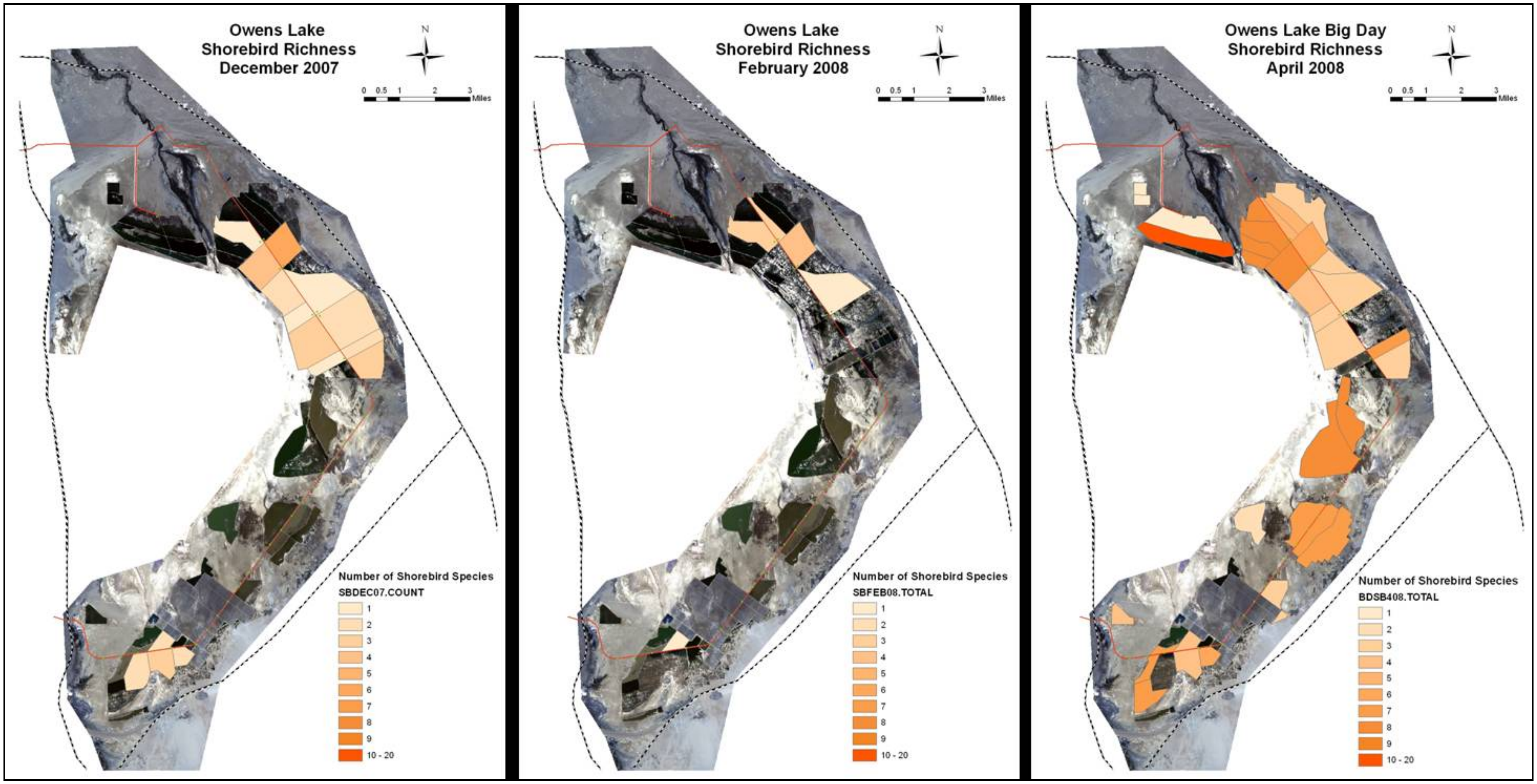


Figure 24. Shorebird Species Richness at Owens Lake in Winter and Spring

4.11. Managed Vegetation

Dust control using managed vegetation consists of irrigated fields provided with subsurface drainage that create soil conditions suitable for plant growth using a minimum of applied water. The saline soil was first reclaimed with the application of relatively fresh water, and then planted with salt-tolerant plants that are native to the Owens Lake basin. Soil fertility and moisture inputs must be managed to encourage plant development and maintenance of appropriate cover values needed to control fugitive dust. Existing managed vegetation areas is irrigated with buried drip irrigation tubing and a complex network of buried tile drains that capture excess water for reuse on the managed vegetation area or in shallow flooding areas.

General wildlife surveys within areas of managed vegetation were conducted by the consulting firms CH2MHILL and BioEnvironmental Associates from 2003 to 2007. These surveys were completed as partial fulfillment of Condition 15 of the CDFG Section 1601 Lakebed Alteration Agreement Number R6-2001-060. Direct and indirect evidence of wildlife use has also been recorded during periodic site visits by LADWP staff. During the first few years following the establishment of managed vegetation plot, wildlife use was minimal. CH2MHILL and BioEnvironmental Associates observed an increase in the use of managed vegetation sites over time as the saltgrass became more established. In 2008, LADWP staff noted continued use of managed vegetation areas by birds, small mammals, and insects.

Numerous terrestrial insects or insect groups have been seen in managed vegetation including harvester ants, spiders (including black widow spiders and jumping spiders), grasshoppers and crickets. Although documented sightings of reptiles in managed vegetation are not known, given the abundance of insects and the presence of small mammals, certain commonly-encountered reptiles such as Side-blotched Lizard and Coachwhip would be expected to occur. The bird species most frequently encountered in managed vegetation are Horned Lark and Common Raven. Other bird species may be encountered in managed vegetation seasonally, or in small numbers include Savannah Sparrow, American Kestrel, and Northern Harrier. There is direct (photostation pictures) and indirect evidence of use of managed vegetation by small and medium-sized mammals. Small mammals known to use managed vegetation include kangaroo rats (*Dipodomys* spp), pocket mice (*Perognathus* spp.), deer mice (*Peromyscus* spp.), and pocket gophers (*Thomomys bottae*). Other small mammal species are expected, however small mammal trapping has not been conducted in managed vegetation plots. Pellets of Black-tailed Jackrabbit (*Lepus californicus deserticola*) and Desert Cottontail (*Sylvilagus audubonii arizonae*) have been seen within plots. Direct and indirect evidence has also been noted for bobcat, coyote, kit fox, gray fox (*Urocyon cinereoargenteus nevadensis*), ringtail (*Bassariscus astutus*), and badger (*Taxidea taxus berlanieri*).

4.12. Gravel

The only area of gravel in the Project area is along Corridor No. 1 where gravel occupies a 30-50 meter wide linear border along the access road. No directed wildlife use surveys have been conducted in this area. The linear nature and lack of resources limits the value of this area to wildlife.

Multiple Snowy Plover have been found utilizing areas along the gravel corridor far away from shallow flood. Snowy Plover have been found in the gravel corridor as far as Turnout 35, which is roughly at the length-wise middle of the corridor, particularly early in the season. It is unknown why these Snowy Plover were utilizing this area but it is possible they were nesting or investigating nest sites. Snowy Plover have nested in gravel islands in T4-3 Habitat Shallow Flood where gravel is similar in the size and depth as well as the type of gravel (dolomite).

Smaller sized gravel is used as a road base and is readily utilized by nesting Snowy Plovers in greater proportion compared to habitat availability. Snowy Plover nests are consistently found on roads and while these nests are more likely to be spotted due to steady travel compared to open playa, this indicates a predilection by Snowy Plovers to nest on the gravelly substrate. Nesting Snowy Plover may also be attracted to some other variables associated with roads.

Lizards may utilize gravel as cover. The limiting resource on Owens Lake is cover from temperature extremes and predation. The other general requisite life history requirements for various reptile species such as food, in the form of insects (at least in proximity to shallow flood) and sunlight (heat for thermoregulation) are readily available in many areas. Side-blotched lizards are becoming increasingly common along roads where there is sufficient cover in the form of road base or rip rap. Desert horned lizards have been infrequently noted in the gravel corridor.

4.13. Data Sources

Information regarding wildlife use of the Project area has been collected by various entities. In order to describe the effects of the dust control Project on wildlife resources, the following sources of information were used:

- Annual Snowy Plover Breeding Surveys:

  Mitigation measures identified in the 1997 SIP EIR included annual Snowy Plover breeding. PRBO conducted the annual Snowy Plover surveys annually starting in 1994 and sporadically since 1978. In some more recent years, these surveys also involved counts of other waterbird species. In 2008, PRBO conducted the breeding surveys, with assistance from LADWP Watershed Resources staff. In 2009 Watershed Resources staff conducted the annual Snowy Plover Survey.

- Snowy Plover preconstruction Clearing Surveys:

  Mitigation measures identified in the 1997 SIP-EIR included preconstruction Snowy Plover clearing surveys. Clearing surveys have been conducted by PRBO or other biological consulting firms hired by LADWP through 2007. From 2008 LADWP staff currently conducts all clearance surveys

- Shallow Flood Drawdown Clearance Surveys:

  LADWP Watershed Resources staff conducts these surveys in July to verify no Snowy Plover nest or broods will be affected by shut-off of water to shallow flood at the end of the dust control season.

- Lake-wide Corvid Surveys:

  As part of the Corvid Management Plan, Watershed Resources staff (2008) and consultants (prior to 2008) conducts this lake-wide corvid counts during a single-day survey following the Annual Snowy Plover Surveys.

- Road Clearing Surveys:

  LADWP watershed resources staff conducted weekly road clearing surveys in 2008. During these surveys, the observer drove slowly along all Project area roads, looking for Snowy Plovers using road areas. The locations of broods and nests were documented during these surveys.

- Semi-annual Wildlife Surveys:

  Southern Zone Dust Control Project Area – The 1601 permit issued by CDFG required wildlife surveys of managed vegetation plots and shallow flood units of the Southern Zone Dust Control Project Area over a period of five years. These surveys were conducted in spring (April) and fall (October) from 2003 through 2007 and completed by BioEnvironmental Associates. LADWP participated in the spring 2007 surveys.

- Project Area Surveys by LADWP Watershed Resources Staff:

  LADWP has performed four different lake-wide surveys with the intent of observing waterbird use during the four periods of use (breeding, fall migration, wintering, and spring migration).

- Surveys Conducted by Volunteers:

  Eastern Sierra Audubon Society organized spring and fall “Big Day” counts in 2008. Both Big Day efforts involved a census of all Owens Lake Dust Control shallow flood areas.

Table 15. Bird Species Observed on Owens Lake

Common Name	Scientific Name
Ducks, Geese and Swans (Waterfowl)	**Anatidae**
American Wigeon	*Anas americana*
Blue-winged Teal	*Anas discors*
Brant	*Branta bernicla*
Bufflehead	*Bucephala albeola*
Canada Goose	*Branta canadensis*
Canvasback	*Aythya valisineria*
Cinnamon Teal	*Anas cyanoptera*
Common Goldeneye	*Bucephala clangula*
Common Merganser	*Mergus merganser*
Gadwall	*Anas strepera*
Green-winged Teal	*Anas crecca*
Lesser Scaup	*Aythya affinis*
Long-tailed Duck	*Clangula hyemalis*
Mallard	*Anas platyrhynchos*
Northern Pintail	*Anas acuta*
Northern Shoveler	*Anas clypeata*
Red-breasted Merganser	*Mergus serrator*
Redhead	*Aythya americana*
Ring-necked Duck	*Aythya collaris*
Ross's Goose	*Chen rossii*
Ruddy Duck	*Oxyura jamaicensis*
Snow Goose	*Chen caerulescens*
Surf Scoter	*Melanitta perspicillata*
Wood Duck	*Aix sponsa*
Loons	**Gaviidae**
Common Loon	*Gavia immer*
Pacific Loon	*Gavia pacifica*
Grebes	**Podicipedidae**
Clark's Grebe	*Aechmophorus clarkii*
Eared Grebe	*Podiceps nigricollis*
Horned Grebe	*Podiceps auritus*
Pied-billed Grebe	*Podilymbus podiceps*
Western Grebe	*Aechmophorus occidentalis*
Cormorants	**Phalacrocoracidae**
Double-crested Cormorant	*Phalacrocorax auritus*
Bitterns, Herons and Allies	**Ardeidae**
Great Blue Heron	*Ardea herodias*
Great Egret	*Ardea alba*
Snowy Egret	*Egretta thula*
Ibis	**Threskiornithidae**
Glossy Ibis	*Plegadis falcinellus*
White-faced Ibis	*Plegadis chihi*

Hawks, Eagles and Allies	**Accipitridae**
Bald Eagle	*Haliaeetus leucocephalus*
Northern Harrier	*Circus cyaneus*
Osprey	*Pandion haliaetus*
Falcons	**Falconidae**
American Kestrel	*Falco sparverius*
Merlin	Falco columbarius
Peregrine Falcon	*Falco peregrinus*
Prairie Falcon	*Falco mexicanus*
Rails, Gallinules and Coots	**Rallidae**
American Coot	*Fulica americana*
Sora	*Porzana carolina*
Plovers	**Charadriidae**
American Golden-Plover	*Pluvialis dominica*
Black-bellied Plover	*Pluvialis squatarola*
Killdeer	*Charadrius vociferus*
Mountain Plover	*Charadrius montanus*
Pacific Golden-Plover	*Pluvialis fulva*
Semipalmated Plover	*Charadrius semipalmatus*
Snowy Plover	*Charadrius alexandrinus*
Stilts and Avocets	**Recurvirostridae**
American Avocet	*Recurvirostra americana*
Black-necked Stilt	*Himantopus mexicanus*
Sandpipers, Phalaropes and Allies	**Scolopacidae**
Baird’s Sandpiper	*Calidris bairdii*
Black Turnstone	*Arenaria melanocephala*
Buff-breasted Sandpiper	*Tryngites subruficollis*
Dunlin	*Calidris alpina*
Greater Yellowlegs	*Tringa melanoleuca*
Least Sandpiper	*Calidris minutilla*
Lesser Yellowlegs	*Tringa flavipes*
Little Stint	*Calidris minuta*
Long-billed Curlew	*Numenius americanus*
Long-billed Dowitcher	*Limnodromus scolopaceus*
Marbled Godwit	*Limosa fedoa*
Pectoral Sandpiper	*Calidris melanotos*
Red Knot	*Calidris canutus*
Red Phalarope	*Phalaropus fulicarius*
Red-necked Phalarope	*Phalaropus lobatus*
Ruddy Turnstone	*Arenaria interpres*
Sanderling	*Calidris alba*
Semipalmated Sandpiper	*Calidris pusilla*
Short-billed Dowitcher	*Limnodromus griseus*
Solitary Sandpiper	*Tringa solitaria*
Spotted Sandpiper	*Actitis macularia*
Western Sandpiper	*Calidris mauri*
Whimbrel	*Numenius phaeopus*
Willet	*Catoptrophorus semipalmatus*
Wilson’s Phalarope	*Phalaropus tricolor*
Wilson's Snipe	*Gallinago delicata*

Gulls and Terns	**Laridae**
Arctic Tern	*Sterna paradisaea*
Black Tern	*Chlidonias niger*
Bonaparte's Gull	*Larus philadelphia*
California Gull	*Larus californicus*
Caspian Tern	*Sterna caspia*
Common Tern	*Sterna hirundo*
Forster's Tern	*Sterna forsteri*
Franklin's Gull	*Leucophaeus pipixcan*
Herring Gull	*Larus argentatus*
Ring-billed Gull	*Larus delawarensis*
Sabine's Gull	*Xema sabini*
Pelicans	**Pelicanidae**
American White Pelican	Pelecanus erythrorhynchos
Skuas and Jaegers	**Stercorariidae**
Long-tailed Jaeger	*Stercorarius longicaudus*
Typical Owls	**Strigidae**
Short-eared Owl	Asio flammeus
Jays and Crows	**Corvidae**
Common Raven	*Corvus corax*
Larks	**Alaudidae**
Horned Lark	*Eremophila alpestris*
Swallows	**Hirundinidae**
Bank Swallow	*Riparia riparia*
Barn Swallow	*Hirundo rustica*
Cliff Swallow	*Petrochelidon pyrrhonota*
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*
Tree Swallow	*Tachycineta bicolor*
Violet-green Swallow	*Tachycineta thalassina*
Wrens	**Troglodytidae**
Rock Wren	*Salpinctes obsoletus*
Marsh Wren	*Cistothorus palustris*
Thrushes	**Turdidae**
Varied Thrush	*Ixoreus naevius*
Wagtails and Pipits	**Motacillidae**
American Pipit	*Anthus rubescens*
Emberizids	**Emberizidae**
Lapland Longspur	*Calcarius lapponicus*
Sage Sparrow	*Amphispiza belli*
Savannah Sparrow	*Passerculus sandwichensis*
Blackbirds	**Icteridae**
Brown-headed Cowbird	*Molothrus ater*
Red-winged Blackbird	*Agelaius phoeniceus*
Western Meadowlark	*Sturnella neglecta*
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*

5.0 HABITAT MANAGEMENT PLAN GOALS AND OBJECTIVES

The overall goal of the OLHMP is to avoid direct and cumulative impacts to native wildlife communities that may result from the Dust Control Program (2008 SIP FSEIR). Direct impacts to wildlife result in the death of individuals, nests, eggs, dependent young, or the direct loss of habitat. Cumulative impacts are a result of incremental changes to the landscape that may result in a decrease in habitat quality, increases in disturbance, or increases in exposure to toxins. These cumulative impacts may cause a decrease in reproductive success, loss of body condition, or result in local population changes or use patterns due to decreases in habitat suitability or productivity.

Under the 2008 SIP FSEIR, specific minimum requirements of the OLHMP were identified and are incorporated into the objectives discussed below. Additional mitigation measures found in the 2008 SIP FSEIR, but not specifically included under Biology-14 further reduce impacts to wildlife. In addition to avoiding direct and cumulative impacts, the OLHMP will serve to guide future management of DCAs in an effort to maintain wildlife habitat conditions within the framework of the dust control Project.

The following is a discussion of the potential direct and cumulative impacts from the Project, based on wildlife habitat management principles, current state of knowledge of wildlife use of the Project area, and Project components.

5.1. Resources of Management Concern

While a variety of taxa use features of the Project area, LADWP has identified resources of management concern based on their abundance at the lake, their state or federal status, or their potential to be impacted by activities or changes within the Project.

5.1.1. Potential Direct Impacts to Resources of Management Concern

As stated above, direct impacts include “take” of wildlife which is defined as mortality of an individual, young, or egg or the modification of adult behavior as a result of human activity that results in the loss of a nest or its contents (2008 SIP FSEIR) and further includes loss of habitat. The following represents a list of potential Project-related sources of direct impacts to wildlife.

Potential Project-related direct impact sources (non-exhaustive):

- *Motorized vehicles and machinery including heavy equipment and ATVs* - Vehicular impacts are most likely to occur to nesting birds. Due to the nature of the Project area, almost all birds nesting in the Project area are ground-nesting species (and primarily shorebirds). The presence of a nest may not be realized unless a bird is actively incubating or brooding on the nest. Even then, the nests of some species can be difficult or impossible to see from a vehicle. Measures to avoid impacts from vehicles, heavy equipment and ATVs will be aimed at minimizing impacts to nesting shorebirds.
- *Foot traffic* – Foot traffic associated with operations, maintenance, construction and recreational use also may impact nesting birds due to the prevalence of ground-nesting birds and difficulty in detecting nests.
- *Collision with infrastructure* – Wildlife collisions with infrastructure could occur under low visibility conditions, or obstacles were by their

nature, not highly visible to wildlife using the area. Wildlife collisions with infrastructure have not been documented and are not expected to occur with any regularity. Structures on the lake are widely-spaced and generally of low-stature. Low visibility conditions such as those created by fog or low-lying clouds are extremely rare. Dust storms, which may also create low visibility conditions, are now rare and localized within the Project area.

- *Entanglements* – Wildlife are susceptible to various and often deadly encounters with manmade products that can cause entanglements. Wildlife may become entangled in trash, fishing line, and fences. Entanglements may result in injury or may prevent animals from feeding or fleeing predators.
- *Poisonings* – Exposure to chemical toxins may cause poisoning or direct mortality of wildlife. Chemical toxins that are known to have caused frequent and recurrent mortality in avian species at other locales include pesticides, polychlorinated biphenyls, lead, selenium, mercury, and salt (Friend 1999). Wildlife may also be affected by the accumulation of biotoxins such as those produced by the bacterium *Clostridium botulinum* leading to botulism, or exposure to toxins produced by some algal species.
- *Epizootic disease* – Disease outbreaks in waterbird species are fairly common worldwide. Examples of the more important waterbird diseases include bacterial diseases such as Avian Cholera (caused by infection with the bacterium *Pasteurella multocida*) and Salmonellosis (caused by infection with *Salmonella* spp.), or viral diseases such as Duck Viral Enteritis (also known as Duck Plague). Conditions conducive to the spread of avian disease may occur in the Project area due to seasonal concentrations of waterbirds. Measures will be aimed to limit the severity or spread of epizootic diseases within the Project area to the extent possible by following principles of wildlife disease management.
- *Predation* – Predation is a part of every wildlife population. Within the Project area, medium-sized mammalian predators are likely favored due to the presence of large numbers of ground-nesting and ground-roosting birds combined with ready access given the numerous roads throughout the area. Avian predators that hunt on the wing or from the ground may also find favorable foraging conditions in the Project area. The impact of predation on wildlife populations of management interest within the Project area is unknown. Measures will be aimed at avoiding actions which may enhance the efficiency of predators within the Project area.

- *Habitat loss* –Habitat destruction alters or eliminates the biotic or abiotic conditions needed for a given plant or animal to complete their life cycle. The Project has increased the amount of suitable habitat for the Western Snowy Plover and other shorebirds and migratory waterfowl by converting existing poor quality habitat for terrestrial upland species to high quality foraging habitat (2008 SIP FSEIR).

5.1.2. Potential Cumulative Impacts to Wildlife Resources

- *Toxicity accumulations* – Continued exposure to environmental toxins may affect the reproductive success of wildlife or result in behavioral abnormalities without causing death. High toxin loads may also make wildlife more susceptible to disease and parasites.
- *Disturbance* – Construction, operation, maintenance and recreational activities in the Project area may subject wildlife to noise, vehicular traffic, or foot traffic. The effect of disturbances varies among wildlife species, season and even time of day. Continued or repeated disturbance of nesting birds may result in nest failure. Continued or repeated disturbance of birds during other times of the year may result in behavioral changes which may or may not be detrimental. In the Project area, the primary management goal will be to limit disturbance to nesting birds of management concern.
- *Habitat degradation* – Within the Project area, conditions are expected to change as the Project evolves. Habitat changes that may cause negative impacts to wildlife include changes in water quality in shallow flood cells to a level that does not support aquatic invertebrates, or the invasion of exotic plant species.

5.2. Objectives to Reduce Impacts and Maintain Resources

The objectives are designed to both reduce direct and cumulative impacts to resources as well as maintain resources.

1. **Minimize wildlife collisions with various motorized vehicles and machinery including passenger vehicles, heavy equipment, and ATVs.**

This objective will be accomplished by the continued implementation of speed limits and road closures where sensitive wildlife resources exist, continued implementation of the lakebed worker education program, clearing surveys, and continued dissemination of information to staff regarding the location of sensitive resources.

2. **Minimize disturbance from construction, operation, maintenance, and recreational activities in the Project area that may subject wildlife to excessive noise, vehicle traffic, or foot traffic.**

The effect of disturbances varies among wildlife species, season, and even time of day. Continued or repeated disturbance of nesting birds may result in nest failure. Continued or repeated disturbance of birds during other times of the year may result in behavioral changes which may or may not be detrimental. In the Project area, the primary management goal will be to limit disturbance to nesting birds of management concern.

3. Minimize entanglements, entrapments, and obstruction to movement of wildlife.

Effort will be made to minimize manmade objects including trash, fishing line and fences that may result in entanglements with wildlife. Management guidelines will reduce these sources of hazards to wildlife in the Project area.

The Moat and Row DCM has the potential for entrapment of Snowy Plover in perimeter moats. Although entrapment of Snowy Plover within moats is expected to be infrequent, in the absence of empirical data or other observations, there is reasonable uncertainty about this assumption. Therefore, a monitoring and adaptive monitoring approach will be taken to address this uncertainty, identify specific incidences of plover entrapment or mortality, and mitigate for significant effects if they occur.

Wildlife use of dry barren playa is limited and the few structures associated with DCMs are of low stature and do not generally produce obstruction to movement. The EIR impact analysis for Moat and Row found part of cell T1A-1 to potentially obstruct movement of Snowy Plover broods due to their inability to fly. To mitigate for this sand fences in the area of concern will be designed to facilitate plover brood movement.

4. Monitor and evaluate environmental levels of various toxins that may cause poisoning or direct mortality of wildlife as well as bioaccumulation of these toxins.

Monitoring of naturally occurring heavy metals and other potential toxins will be conducted by sampling a subset of DCM cells lake-wide, as required in mitigation measure Biology-6 in the 2008 SIP FSEIR. Media-specific concentrations (water, sediment, algae, invertebrate tissue, tissues of salvaged birds and non-viable eggs) will be compared to toxicity benchmarks of screening values obtained from previous studies on toxicity to avifauna to evaluate whether bioaccumulation of toxic substances is occurring due to the Dust Control Project.

This objective will also address early detection of toxicity problems with these various heavy metals and other toxins as well as appropriate and timely responses.

5. Monitor for wildlife mortality and potential epizootic disease outbreaks.

Disease outbreaks in waterbird species are fairly common. Examples of the more important waterbird diseases include Avian Cholera, Botulism, Duck Viral Enteritis, and Salmonellosis. Conditions conducive to the spread of avian disease may occur in the Project area due to the seasonal concentration of waterbirds. Measures will be aimed to limit the severity or spread of epizootic diseases within the Project area to the extent possible by following principles of wildlife disease management.

6. Avoid enhancing the efficiency or number of predators within the Project area.

Management will focus on the main predators of Snowy Plover eggs and broods and other nesting shorebirds and waterfowl on Owens Lake. The focal predators that will be considered are Common Ravens, California Gulls and mammalian predators. Efforts will be aimed at avoiding actions that may inadvertently increase populations of these predators, attract predators to nesting areas, or increase their hunting or foraging efficiency.

7. Within the Environmental Impact Report analysis areas for 2008 State Implementation Plan dust controls, achieve no net loss of riparian or aquatic baseline habitat functions and values or total acres of these habitats (2008 SIP FSEIR).

A wetland mitigation area has been designated in the Managed Vegetation DCM for all Project impacts to Dry Alkali Meadow. Impacts to Moist Alkali Meadow and Saturated Alkali Meadow wetlands under the 2003 SIP FEIR, have been mitigated for in the T30-1 Wetland Management Area. These areas will be monitored for appropriate coverage of native plant species and for a change in the extent of coverage over a five-year period post-construction. The Project emphasizes restoration of equivalent functions and values of impacted wetlands.

LADWP will comply with all applicable requirements of the wetlands mitigation program. Staff on the lakebed will stay within the Project area to avoid impacts to wetlands that could require additional mitigation.

8. Manage shallow flood DCMs for habitat quality to sustain waterbird nesting and foraging habitat while reducing water use for dust control.

Native wetland species are colonizing some areas of shallow flood cells where salinity, soil and hydrologic conditions are supportive of their growth. This vegetative growth will not be discouraged. Some shallow flood cells will be managed for the establishment of vegetation in order to control dust, reduce fetch length and reduce overall water use. The establishment of wetland species will increase the diversity of habitats available for wildlife. This change will provide additional nesting opportunities for species that typically nest in vegetated sites (e.g., waterfowl and some shorebird species) while reducing water use.

Ongoing monitoring will help identify the response of wildlife to these changes and direct future management.

9. Monitor for and control noxious weeds.

A noxious weed control program is being implemented for the entire Project Area. This program consists of monitoring efforts as well as best control measures for controlling Noxious Weeds that colonize Owens Lake DCMs.

10. Manage salinity levels and water quality in shallow flood DCMs for a productive and diverse invertebrate community.

Water quality will be managed for dust control within water use efficiency and other dust control constraints to maintain invertebrate productivity and diverse invertebrate communities. The main environmental variable that influences invertebrate productivity and creates different invertebrate communities is water salinity.

The primary foraging resource for water birds in shallow flood areas is larval and adult brineflies (*Ephydra* spp.). Other invertebrate taxa that are relatively abundant in shallow flood habitat are water boatman, midge larvae, a predacious diving beetle, a minute moss beetle, and a long-legged fly.

Given the effect of salinity on aquatic invertebrate communities in the project area, salinity (or specific conductivity) values up to 100 mS/cm will support diverse and abundant food supplies. Managing for diverse salinity ranges so that freshwater, brackish, and saline conditions exist which, in turn, support different invertebrate communities.

LADWP will manage water used for dust control for water quality sufficient for invertebrate reproduction where feasible. It must be recognized that not all shallow flood will have salinity within ranges for invertebrate production due to operational constraints and water conservation efforts.

Water quality monitoring is being implemented for the SZDCP in compliance with the Lahontan California Regional Water Quality Control Board (CRWQCB) requirements for dust control areas. In addition, due diligence monitoring is being implemented lake-wide for salinity.

Water quality monitoring is guided by a Sampling Analysis Plan developed to satisfy Lahontan CRWQCB WDID No. 6B140009003 and includes complete trace elements of ecological concern.

11. Maintain a baseline population of 272 Snowy Plovers.

Due to concerns about the impact of the Dust Control Project on Snowy Plover, the 2003 SIP EIR established a baseline level of plovers that must be maintained in order to protect the breeding population at Owens Lake. The baseline number was set at 272 adult plovers. The number of Snowy Plover has increased since the onset of shallow flooding and there is no indication that the Project has negatively impacted Snowy Plover.

The increase in habitat combined with the many Snowy Plover impact avoidance and minimization measures (objectives discussed previously) will continue to provide significant protection for the Snowy Plover population. In the event that the number of Snowy Plover falls below baseline, possible reasons for the decline will be evaluated. If the decline is attributable to the dust control project, appropriate actions will be taken in order to maintain baseline numbers.

12. Maintain hydrologic regime for Snowy Plover to complete their nesting cycle.

The 2003 and 2008 SIP EIRs states that a habitat management program shall be implemented by the City of Los Angeles Department of Water and Power on all Owens

Lake bed shallow flood areas to mimic the natural summer drying of seeps and springs in the area. Water application on Owens Lake through June 30 is required for dust control. After July 1, water application to Owens Lake is only required for Snowy Plover, specifically for nests or broods. The purpose of the "slow shut-down" is to avoid drastic changes to water resources in areas of Snowy Plover brooding or nesting. The slow shut-down, also called "Snowy Plover habitat maintenance flows" allows brooding and nesting birds time to adapt to the change in resource distribution during the reproductive period. In shallow flood areas where plovers have nests or broods, shallow flood laterals are turned off slowly from July 1 to July 21. Snowy Plover management flows may persist in shallow flood cells after dust control season each year to allow Snowy Plover to complete their nesting cycle.

13. Ensure that the approximately 17.5 acres of proposed dust control measures that are within California Department of Fish and Game Cartago Springs Wildlife Area are compatible with the designated land use. The California Department of Fish and Game has determined that Habitat Shallow Flood or habitat restoration would be compatible with the Cartago Springs Wildlife Area's designated use.

There is currently no proposed construction of traditional DCMs in the Cartago Springs Wildlife Area. The portion of Cartago Springs Wildlife Area that was designated as emissive is part of a large area in the south portion of Owens Lake. Only a portion of this area has been observed in the past to contribute to shoreline PM_{10} violations, therefore only low levels of control efficiency are required to avoid violations. Therefore, no DCMs are needed in the Cartago Springs Wildlife Area since the appropriate level of dust control can be obtained without utilizing that property.

14. Enhance existing vegetation in the Channel Areas

The Channel Areas are located on the southern portion of the lake bed. This area receives drainage that flows south to north from Cartago Creek toward the brine pool. This area is characterized by varying topography and scattered patches of DAM. Seasonal water application and other applicable measures during appropriate times will enhance vegetative cover for dust control which will benefit wildlife resources.

Goals and Objectives for Specific Areas

Certain cells that consist of shallow flood are managed as shorebird habitat. The goals for these areas are discussed below.

Designated Shorebird and Snowy Plover Habitat of 1000 acres

15. Manage 1,000 acres in perpetuity for shorebirds and Snowy Plovers in Zone II in consultation with CDFG.

Prior to construction of the SZDCP LADWP entered into a Lakebed Alteration Agreement No. R6-2001-060 with CDFG. In addition, the CSLC issued an Amendment of Lease PRC 8079.9 (State Lands Lease) for construction and operation of SZDCP components that occur on state lands on the Owens Lake. These two agreements contained measures that required LADWP to set aside and manage an area that would be dedicated as Western Snowy Plover and shorebird nesting and foraging habitat in perpetuity. This requirement was based on insufficient data available on the extent of pre-project shorebird use of a portion of the SZDCP area in the southeastern portion of Owens Lake.

Agreement requirements pertaining to designation of shorebird habitat in perpetuity are specified in Condition 9 of the LAA and in Condition 2(c) of the State Lands Lease. The language is summarized as follows:

- Operator (LADWP) shall commit to setting aside and managing an area that will be dedicated as Snowy Plover and shorebird nesting and foraging habitat.
- Shallow flood operation as specified in the 1997 EIR, or other appropriate habitat, including habitat maintenance flows (flows will be from July 1 to July 21).
- Maintenance of sufficient water quality to support brine flies and/or other aquatic invertebrates that in turn would support shorebird use.
- Maintenance of hydrologic regime suitable for Snowy Plover and other shorebirds.
- Maintenance of minimum levels of vegetation, and means of vegetation control to keep it to a minimum.
- Maintenance of a 0.5-mile undeveloped buffer that should not contain predator perches.

A Habitat Management Plan (HMP) was completed for this designated habitat in 2004 as part of requirements in the Lakebed Alteration Agreement No. R6-2001-060 with CDFG. Information such as future goals and methods for maintaining the habitat contained therein is included in the OLHMP when appropriate.

16. Manage 145 acres of habitat adjacent to Dirty Socks Spring as shorebird foraging habitat.

Pursuant to Condition No. 16 of the 2001 Lakebed Alteration Agreement (Agreement No. R6-001-060, page 5), the Project was expected to adversely impact 63 acres of shorebird foraging habitat at Dirty Socks Spring. Therefore, the City of Los Angeles Department of Water and Power was required to create 145 acres of Habitat Shallow Flood suitable for shorebird foraging.

The shallow flood DCA cell T4-3 was designated as “Habitat Shallow Flood”. This cell is expected to continue to be used to satisfy this mitigation measure by providing shorebird foraging habitat.

17. Maintain a minimum of 523 acres of habitat specifically for Snowy Plover nesting.

Under the 2008 SIP FSEIR, LADWP is required to maintain a minimum of 523 acres of habitat specifically for Snowy Plover in perpetuity at Owens Lake in consultation with the CDFG. Suitability of shallow flooding habitat for Western Snowy Plover consists of a mix of exposed sandy or gravelly substrate suitable for nesting in close proximity to standing water equal to or less than 12 inches in depth (2008 SIP FSEIR District). The area to be designated consists of 523 acres (not including vegetated areas within playa) of land owned by the City of Los Angeles and located on the eastern shore of Owens Lake (Figure 25).

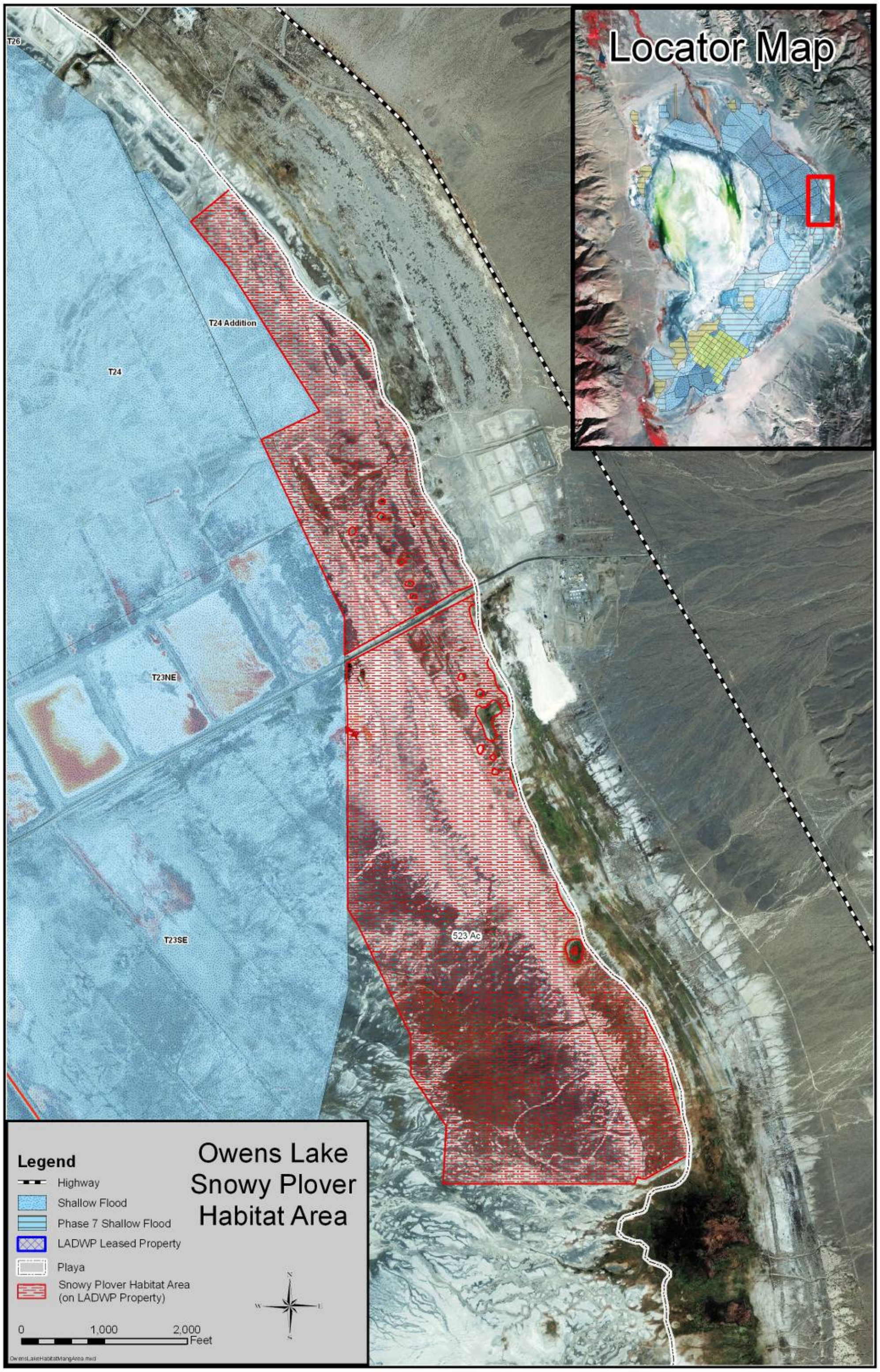


Figure 25. Designated Snowy Plover Nesting Habitat

18. Open Water Habitat

The 2008 SIP FSEIR includes, as a mitigation measure, the designation of an appropriate amount of deep-water habitat "to avoid direct and cumulative impacts to native wildlife communities that may result from the proposed project". The specific requirement is as follows:

> "Under the 2008 SIP FSEIR, LADWP will develop and manage an appropriate amount of deep-water habitat in perpetuity in order to support focal migratory waterbirds determined to be present during 1995–1997 baseline surveys in support of the 1998 State Implementation Plan. This shall include a variety of waterbirds that use Owens Lake as a temporary stopover habitat during spring and autumn migration; waterbirds that are adapted to saline conditions such as Eared Grebe (*Podiceps nigricollis*), Wilson's Phalarope (*Phalaropus tricolor*), and California Gull (*Larus californicus*); and other waterbirds including waterfowl that can tolerate saline or brackish conditions such as gadwall (*Anas strepera*) and lesser scaup (*Aythya affinis*), among other species."

This requirement, as stated in the 2008 FSEIR, has conflicting direction. There was no deep-water habitat within the Project area during baseline surveys. Additionally, no "deep-water" habitat has been impacted by construction and none of the specific waterbird species noted above, described as being "focal", were present in the Project area during the baseline surveys.

As described in Section 2-Baseline Wildlife Resources, additional waterbird species were documented, but it should be recognized that the majority of these species were only found in areas adjacent to but outside the Project boundary and Project footprint. Small numbers of shorebirds were found in the Project footprint during baseline surveys, usually associated with flood irrigation test projects where water was being spread onto bare playa. The waterbird species found to be present adjacent to the Project area include a variety of shorebird species, and nine waterfowl species: Mallard, Blue-winged Teal, Green-winged Teal, Gadwall, American Wigeon, Cinnamon Teal, Northern Pintail, Northern Shoveler, and Snow Goose. These waterfowl were seen in the upper reaches of the brine pool and southern portion of the Owens River delta, areas adjacent to but outside the Project footprint and unaffected by construction. There were no waterfowl or any of the focal waterbirds (listed previously) observed in habitat impacted by the Owens Lake Dust Control Project. Therefore the appropriate acreage of "deep water habitat" as mitigation for the Project is 0 acres.

However, the Project has created habitat for 15 waterfowl species, based on spring surveys within the Project area. A total of 19 species of waterfowl were counted including all seasons from winter 2007 to fall 2008 within the Project area. While this habitat will be maintained as described in Section 6 there is concern that some of these areas should be preserved for waterbird species that prefer ponded open water habitat. Species that may be found more commonly in open water on Owens Lake include Eared Grebe, Red-necked Phalarope, and ducks that may dive when foraging including Ruddy Duck, Bufflehead, Lesser Scaup, and Redhead.

Given this recognition it has been determined that approximately 316 acres in pond shallow flood cell T30-2 would satisfy the habitat needs of these open water species. T30-2 has had the most use by these species compared to other DCM cells (see Section 4). This area, termed "Designated Open Water Habitat", will be operated as shallow flood in perpetuity or until an agreement on the overall Owens Lake Master Plan is reached that will define areas of core habitat and areas designated for waterless dust control measures.

6.0 RESOURCE MANAGEMENT ACTIONS

This section describes the operation and maintenance guidelines that are necessary to achieve the objectives set forth in Section 5 for the entire Dust Control Project area. LADWP will manage DCAs in a manner that is compatible with wildlife needs to the extent possible, with the recognition of dust control obligations and water conservation efforts. Future monitoring will help fill in information gaps, assist in management refinement, and evaluate the attainment of objectives. It must also be recognized that certain operational constraints exist, and since the Project is not yet at full build-out, not all operational constraints are fully known. In addition, conditions within some cells will continue to evolve as vegetation becomes established and specific requirements for dust control areas change or are refined.

6.1. Minimize Wildlife Collisions with Various Motorized Vehicles and Machinery Including Passenger Vehicles, Heavy Equipment, and ATVs.

6.1.1. Speed Limits

Speed limits in the Project area are 30 mph on mainline, and 15-25 mph on side roads, depending on road condition including narrowness and surface conditions during construction. These speed limits were imposed primarily for safety reasons and to minimize dust generation. Additional speed restrictions have been in place as required mitigation to minimize potential direct and cumulative impacts to Snowy Plover and other sensitive biological resources. The speed limit within the buffer zone of active Snowy Plover nests is 15 mph in order to minimize impacts. Temporary speed limits may also be imposed at the discretion of resource staff when other resource issues exist such as the presence of nests or broods of other species. In addition to addressing dust and safety concerns, existing speed limits are generally low enough to minimize wildlife collisions, allowing wildlife to move out of harms way, or allowing drivers to see wildlife on roadways and avoid impact.

6.1.2. Road Closures

Road closures may occur where various bird species nest on the roadway, or along the roadway edge. Roads will be closed to protect Snowy Plover nests when the nest buffer intersects a road. No vehicular traffic is allowed within road closure areas. The road will remain closed until the nest is no longer active. Lakebed workers and visitors are required to observe road closures.

6.1.3. Nest and Road Closure Status

The District, CDFG, and all lakebed workers will be provided with the location of all known active Snowy Plover nests. Within 24 hours of the discovery of a previously unreported Snowy Plover nest, LADWP will provide electronic notification to the District, CDFG, and all lakebed workers the nest location. Updated information of where active nest buffers overlap with roads will be available to operations staff during the Snowy Plover breeding season.

6.1.4. Lakebed Worker Education Program

The lakebed worker education program consists primarily of Snowy Plover Awareness Training. Snowy Plover Awareness Training provides information on Snowy Plover identification, basic biology and natural history, the recognition of alarm behavior, and applicable mitigation measures. All construction, operation, and maintenance staff working within the Project area are required to adhere to Snowy Plover mitigation measures. Lakebed staff will continue to attend Snowy Plover Awareness Training annually.

6.1.5. Snowy Plover Clearance Surveys

During the Snowy Plover breeding season from March 15 to August 15, a clearance survey will be performed prior to construction, operation, or maintenance activities that involve ground-disturbing actions. During normal maintenance activities in the shallow flood dust control areas during the Snowy Plover breeding season crews must use hand tools and be on foot or use all-terrain vehicles where Snowy Plover may be present. Work will be minimized as much as possible to reduce impact on Snowy Plover. If it is necessary to use heavy equipment in an area, a clearance survey for Snowy Plover nests or broods will be performed and any nests found will have appropriate buffers marked.

6.1.6. Emergency Repairs and Activities

Emergency repair activities are exempt from the compliance strategies provided in this section. An emergency is defined as “a sudden, unexpected occurrence that presents a clear and imminent danger, demanding action to prevent or mitigate loss of or damage to life, health, property, or essential public services” (CEQA Section 15269). An emergency is further defined under the 2003 SIP as those repairs that must be made immediately to protect human health and safety, ensure the project is in compliance with required air quality standards, or protect Project infrastructure from significant and immediate damage that could result in the failure of a dust control measure to maintain compliance with required air quality standards.

In the event that an emergency repair must be performed in a shallow flood cell during the Snowy Plover breeding season, a biological monitor will be on site during the duration of the repair activity to document any impacts to Snowy Plover adults, juveniles, or active nests.

6.2. Minimize Disturbance from Construction, Operation, Maintenance, and Recreational Activities in the Project Area that may Subject Wildlife to Excessive Noise, Vehicle Traffic, or Foot Traffic.

The implementation of speed limits, road closures, clearance surveys, and a lakebed worker education program, as described earlier, will assist in meeting this objective. Other measures that will assist in meeting this objective include nest buffer area guidelines for Snowy Plover, lighting guidelines, and the consideration of wildlife impacts from public access. In the Project area, the primary management goal with regard to this objective will be to limit disturbance to nesting birds of management concern.

6.2.1. Snowy Plover Nest Buffers

A buffer zone will be created around known Snowy Plover nests in order to limit both direct and indirect disturbance to nesting birds. The size of buffer zones and the specific method of identifying the buffer zones have changed during the life of the Project and may potentially change in the future. In order to reduce disturbance to nesting Snowy Plovers only Snowy Plover nests that are in the immediate vicinity of operation and maintenance activity will have nest buffers marked. This will reduce the chance that predators, such as Common Ravens and coyotes, will investigate the area and locate nests.

Currently, the buffer zone is a 200-foot radius area around a nest. Buffer zones will be marked using green-colored stakes of less than 60 inches in height placed at cardinal points equidistant from the nest. Within nest buffer zones, all lakebed workers are required to adhere to the following guidelines:

- Limit vehicle speed to 15 miles per hour; no parking is allowed.
- Limit maintenance activities to within 20 feet of existing infrastructure.
- Limit work time to no more than 15 minutes of every hour (45-minute break between 15-minute work periods).

6.2.2. Lighting

If night work is necessary, LADWP will make every effort to shield lighting on equipment downward and away from natural vegetation communities or playa areas, and especially away from known nesting areas of Snowy Plover during the nesting season.

6.2.3. Public Access and Use

LADWP recognizes the desire for public access to the lakebed for recreational activities such as bird watching, hiking, nature studies, hunting, and photography. Public access will be evaluated to minimize potential disturbances to nesting or foraging Snowy Plover and other waterbirds while providing for recreation.

Public access will be in compliance with California State Lands Lease and with the Policy for Public Access to LADWP facilities at Owens Lake, dated May 2004, or any subsequent revisions or addenda thereof. LADWP maintains authority to close roads for construction and maintenance for the safety of both the public and for LADWP personnel.

An access plan is currently being developed for complete build out of dust control measures after Phase 7 construction.

6.3. Minimize Entanglements, Entrapments, and Obstructions to Movement of Wildlife

Wildlife may become entangled in miscellaneous discarded construction-related items or other trash, fishing line, or fences. There is minimal fencing in the Project area, and fishing line is not expected to be encountered in the Project area due to a lack of fish, and thus recreational fishing. Monofilament line may be used as a perch deterrent above sand fencing in Moat and Row areas but will be limited to 2 inches above the sand fence to avoid entanglement. This objective will be met primarily through continued implementation of the Corvid Management Plan which requires the control of trash in the Project area, the Lakebed Worker Education Program and a monitoring and adaptive management for moat entrapment.

6.3.1. Corvid Management Plan – Refuse Management

One aspect of the Corvid Management Plan is refuse management. All refuse containers on the lake must be secure receptacles with lids that prevent wildlife access. While the focus of this measure is to avoid attracting potential nest predators such as ravens and coyotes into the area, this action also will prevent trash that could lead to entanglements from being distributed onto the lakebed.

6.3.2. Lakebed Worker Education Program

The Snowy Plover Awareness Training portion of the lakebed worker education program directs workers not to leave any form of trash on the lakebed.

6.3.3. Other Entanglement Issues

LADWP staff will be responsive to other entanglement risks if they arise. If an entanglement occurs, LADWP staff will evaluate the event and determine if there is a continued risk to wildlife and then respond appropriately.

6.3.4. Moat Monitoring and Adaptive Management for Entrapment of Snowy Plover

LADWP is currently in the process of developing a moat entrapment monitoring and adaptive management strategy for the Moat and Row DCM. The moat monitoring and adaptive management plan will include the following components per the 2009 Moat and Row FSEIR:

- a monitoring schedule, including the timing and frequency of monitoring;
- a description of monitoring locations and procedures;
- selection of indicators for identifying the type and extent of impacts to Snowy Plover due to moat entrapment;
- specific quantitative response triggers to indicate thresholds requiring management action;
- a list of corrective management actions appropriate for each type and extent of impact; and
- documentation and reporting requirements

6.3.5. Obstruction to Brood Movement

In three blocks in moat and row cell T1A-1, fence gaps designed to facilitate brood movements will be regularly distributed over relatively short distances, and easily accessed by plover broods as described in the 2009 Moat and Row FSEIR. Plover broods will be able to physically fit through fence gaps, and will be able to efficiently locate the gaps during movements due to the frequent spacing. Monitoring of sand fence gaps will be implemented based on requirements in the 2009 Moat and Row FSEIR.

6.4. Monitor and Evaluate Environmental Levels of Various Toxins that may Cause Poisoning or Direct Mortality of Wildlife as well as Bioaccumulation of These Toxins.

Ecological toxicity monitoring and risk screening analysis have been conducted on Owens Lake since 2001 in order to assess potential contamination risk to wildlife species. The assessment has consisted of sampling water, sediment, invertebrates, nonviable bird eggs, and, when possible, salvaged water birds for various constituents. These data are evaluated to determine their exceedances with respect to ecological toxicology screening values. Results are summarized below.

In 2005, the concentration of arsenic, barium, boron, and selenium in water and sediment were significantly positively related to overall salinity. These relationships suggest that sites managed for higher salinity at Owens Lake are likely to result in higher concentrations of these inorganic constituents. Only a limited number of locations have been sampled in shallow flood, however most areas with the potential for highest salinity (and other constituent) levels have been sampled.

In 2008, some constituents were elevated above eco-risk screening levels in most tested media for a majority of the sites sampled (i.e., aluminum, arsenic, barium, boron, chromium, copper, and zinc).

In 2008, on a site-by-site basis, constituent levels that showed a correlation between abiotic (water or sediment) and biotic (invertebrate) media include aluminum, boron, and zinc. This correlation helps determine the likelihood that these constituents pose a risk to avian fauna that inhabit and feed in these habitats throughout the Owens Lake playa.

Qualitative comparisons between constituent levels between years within commonly sampled media showed that many constituents appear to be lower in flooded habitats in 2008 than in 2005. However, there was spatial variation found across the playa. The 2008 data also indicate that certain constituents have increased in flooded habitats within the Project. Examples of elements higher in 2008 samples include zinc in insect and sediment samples, and arsenic, lead, and mercury in sediments. In addition, although there was variation among media types, in 2008 there was a general trend for southern zone sites to be more elevated in contaminant levels than the northern zone sites.

Since ecological toxicity monitoring was initiated, relatively few carcasses have been found. In addition, there is high use by other species and presence of multiple broods of nesting shorebird species. While there is some exposure of wildlife to naturally occurring heavy metals and toxins at Owens Lake, there are no apparent impacts or trends to date related to ecological toxins. Ecological toxicity monitoring will continue following the Sampling and Analysis Plan and other requirements.

6.4.1. Toxicity Management

The objectives are to reduce the impact of various contaminants to native wildlife populations. Many constituents vary in their toxicity and bioavailability depending on changing environmental conditions such as pH, temperature, and organic matter among other factors.

Contaminants do not appear to be a problem or risk at this point but are required to be tracked in the 2008 SIP FSEIR and by the Lahontan Regional Water Quality Control Board (RWQCB) for evolving salinity and trace element conditions through an ecological toxicity monitoring program.

Continued operation of shallow flood cells using freshwater in sheet flow areas may move heavy metals in soils to lower elevation ponds as the constituents become suspended in water. In addition, the construction of Phase 7 shallow flood will change some operation of current shallow flood in order to efficiently move and use the limited water available through the main pipeline. Operations will be continually refined to control dust with the maximum water use efficiency. The amount of brine water that flows down gradient to various low elevation ponds will vary seasonally and yearly depending on dust control needs. Therefore the accumulation of salts and other heavy metals in these ponds and its quantitative influence on toxicity is unknown. Additionally these lower elevation ponds may be operated as salt sinks for salt management in order to manage for appropriate salinity ranges in various areas.

Water quality and ecological toxicity monitoring will continue in order to observe any impacts to wildlife. Adaptive management procedures will implemented if native wildlife populations develop signs of toxicity attributable to operation of dust control measures. Management actions may include identification and management of contaminant sources, dilution by addition of fresh water, elimination of contaminated food resources, or other appropriate measures.

If heavy metals accumulating in certain ponds are resulting in impacts, one option to keep wildlife from utilizing the area is to increase salinity to beyond what brine flies and other aquatic invertebrates will tolerate, thus eliminating food resources. There is a strong positive correlation between many heavy metals and salinity; therefore ponds that are experiencing heavy metal accumulation are likely approaching salinity thresholds for invertebrates. As salinity passes the threshold for the production of brine flies and other invertebrates (approximately 120 to 150 g/L) waterbirds would not be attracted to these areas to forage. Since these ponds would offer no forage base, wildlife would likely not ingest contaminated food or water, especially given the availability of other resources across the lake.

If the lack of forage in these ponds does not eliminate impacts to waterbirds another option would be to apply Bird Balls™. These are large plastic balls that float on the surface of the water which have been used successfully to keep waterfowl from utilizing large ponds. These balls can also be water filled in order to stay in place during wind storms.

6.5. Monitor for Wildlife Mortality and Potential Epizootic Disease Outbreaks

Due to the migratory nature of the birds using Owens Lake, the occurrence of an epizootic disease outbreak cannot be prevented. The severity of an epizootic outbreak at Owens Lake however may be reduced. Based on the observations of staff and the low number of bird carcasses salvaged to date, no disease outbreaks have occurred to date in the Project area.

6.5.1. Disease Management

Disease outbreaks in waterbird species are fairly common. Examples of the more significant waterbird diseases include avian cholera, botulism, and duck viral enteritis. Conditions conducive to the spread of avian disease may occur in the Project area due to the seasonal concentration of waterbirds. Measures will limit the severity or spread of epizootic diseases within the Project area to the extent possible. The primary source of infection for many diseases is contamination of food or water resources by diseased birds – either live birds or decaying carcasses, depending on the disease.

Avian botulism is caused by a toxin from *Clostridium botulinum* that occurs in stagnant alkaline water. *Clostridium botulinum* is widespread in wetland soil (as spores) and will grow in anaerobic conditions. These conditions can occur in ponds where masses of algae debris settle to the bottom of a pond where they decay and trap planktonic animals thereby turning conditions anaerobic (Rocke and Friend 1999). In part to limit these conditions, areas with deep stagnant water are minimized. Other environmental factors also play a role in outbreaks which would be most likely to occur in fresher areas of shallow flood. Estimates of up to 500,000 deaths of various waterfowl were due to botulism in the Great Salt Lake in 1997 and low level outbreaks continue to occur (Aldrich and Paul 2002).

Avian cholera is an infectious disease resulting from infection by the bacterium *Pasteurella multocida*. Environmental contamination from diseased birds is a primary source for infection. High concentrations of *P. multocida* can be found for several weeks in waters where waterfowl and other birds die from this disease (Friend 1999). Thus, prompt removal of carcasses may prevent the spread of cholera, if that was the cause of death.

Duck viral enteritis (duck plague) is caused by a herpes virus. Duck plague outbreaks are thought to be caused when birds that carry the virus shed it though fecal or oral discharge, releasing the virus into food and water (Friend 1999).

West Nile virus is a relatively new pathogen to occur in the west. Since it is not directly communicable (i.e., insect borne), management is based on controlling potential mosquito vectors. Mosquito control is performed by Inyo County Mosquito Abatement as discussed in Section 6.10.3.

Operations staff are on Owens Lake daily and Watershed Resources staff are frequently on the lake (several times per week). Operations staff are instructed to notify Watershed Resources of dead, sick, or injured wildlife to be removed as part of the Lakebed Worker Education Program specifically in the Snowy Plover Awareness Training.

In addition to documenting the specific location of the observation, other pertinent information documented will be an estimate of the age of the carcass, the condition of the carcass, and any notes regarding environmental factors or symptoms noted for other birds in the area. Dead waterbirds will have a field necropsy performed, if time allows. The field necropsy will record gross abnormalities in tissues and organs. Tissue samples will be taken for laboratory analysis of environmental toxins such as heavy metals.

6.6. Avoid Enhancing the Efficiency or Number of Predators within the Project Area.

Methods related to this objective will be aimed primarily at limiting food subsidies to potential shorebird predators, and avoiding enhancement of predator efficiency. Additionally, staff will avoid other actions that may attract predators or influence predator efficiency. This objective will be met primarily through implementation of the Corvid Management Plan and secondarily through the Lakebed Worker Education Program.

6.6.1. Corvid Monitoring and Management Program

In response to an initial perceived increase in the number of Common Raven in the Project area after the initiation of shallow flooding, and observations of occasional use of manmade features, concerns were raised regarding the potential impact of this species as a Snowy Plover predator. The result was the requirement that LADWP develop a Corvid Management Plan as initially described in the 2003 SIP. This mitigation measure is also required under the 2008 SIP FSEIR as Measure Biology-11.

The measures listed below will continue to be implemented through the life of the Project. The measures below will limit food subsidies for Common Ravens and other omnivorous species and potential nest predators such as gulls, and limit perching opportunities created by project infrastructure.

- Lakebed trash management procedures associated with dust control measures to avoid attracting ravens.
- Utilization of Nixalite or the functional equivalent on all structures greater than 72 inches high to reduce perching opportunities.
- Burial of power and communication lines on all lakebed areas below the elevation of 3,600 feet.

Other measures to be implemented specifically in conjunction with the Moat and Row DCM, will be that within 0.25 miles of occupied shorebird nesting habitat, sand fencing and fence posts will be designed to prevent perching by corvids. Sand fence design to deter perching by corvids will include the installation of: (1) Nixalite or the functional equivalent on the tops of fence posts; and (2) monofilament line or the functional equivalent along and above the sand fence fabric. To avoid a potential avian collision hazard, monofilament or other line will be installed no greater than two inches above the top of sand fence fabric. Within 30 days prior to the Snowy Plover breeding season (March 15–August 15) each year, the perch deterrent structures will be inspected. If a structure has been damaged or otherwise needs maintenance, it will be repaired at that time.

Additional measures that have not been used to date but that may be employed include the use of harassment techniques in specific instances where corvids are proving to be particularly harmful to nesting shorebirds.

6.6.2. Other Measures to Limit Predation-related Impacts

Predators other than Common Ravens may impact Snowy Plover and other nesting shorebird species including California Gulls and mammalian predators. Some predator species are known to “key in” on visual or olfactory cues to aid in finding food. To help lessen this effect, Snowy Plover nests are not marked with rocks or other objects in order to avoid attracting predators to the nest. In addition, visits to nest sites are conducted only when necessary in order to limit olfactory clues. For example, when updates to the status of a nest are needed, Watershed Resources staff will first view the nest from afar to determine if an adult is incubating or if adults are still present in the area. If either condition exists, the nest is presumed to still be active, and closer approach is not necessary. Not only does this disturbance-minimizing procedure avoid the drawing attention to nest locations by preventing the alarm behavior response of adult Snowy Plover, these actions reduce other behaviors that may increase predation impacts or hunting efficiency.

6.7. Within the Environmental Impact Report Analysis Areas for 2008 State Implementation Plan Dust Controls, Achieve No Net Loss of Riparian or Aquatic Baseline Habitat Functions and Values or Total Acres of These Habitats (2008 SIP FSEIR)

Table 16. Habitat Within the Phase 7 DCA (2008 FSEIR District)

Plant Community	Element Code/Type	Current Status	*Acres (Percent of Total)
Barren	N/A	N/A	8,506 (91%)
Dry Alkali Meadow, a type of Transmontane Alkali Meadow (TAM)	41.200.00 (CNDDB) 45310 (Holland)	G3, S2.1	413 (4%)
Shadscale	36.320.00 (CNDDB) 36140 (Holland)	G4, S3.2	425 (5%)
Total			9,344
**Acreages that exist within dust control areas that may not necessarily be impacted by the Project*			

Dry Alkali Meadow (DAM) is considered wetland habitat where it is located on wetland soils and has appropriate hydrology. When impacts to DAM wetlands are identified after Phase 7 construction, DAM will be designated within the managed vegetation DCM with an associated management plan.

Impacts to DAM to date from previous phases of the project have been mitigated. Table 15 shows the acreage of habitats within Phase 7 DCMs. Table 16 shows impacts through the life of the dust control Project. Not all of this impact has been realized. Approximately 75 acres was projected to be indirectly impacted due to “infiltration of the water from shallow flooding and managed vegetation control measures into the water table, causing a rise in the water table, and root salinity levels to exceed physiological tolerances” following 20 years of operations (1997 SIP EIR).

DAM-equivalent wetlands have been created in the managed vegetation DCM. Managed vegetation is considered equivalent to DAM (2008 SIP FSEIR) due to its similarity in vegetative cover and composition as compared to naturally-occurring DAM. Acreage and cover requirements are in place to insure the managed vegetation does not become emissive. LADWP has currently created 2,260 acres of managed vegetation area and maintains an average of 42% total vegetative cover measured by satellite imagery and calibrated using on the ground photography (NewFields 2007). Managed vegetation areas also support wildlife species associated with DAM. The managed vegetation that has been planted has greatly increased the habitat values for many species over the pre-project condition of barren playa.

The total acreage of Moist Alkali Meadow (MAM) and Saturated Alkali Meadow (SAM) communities impacted by the Project is 34.3 acres, 27.7 and 6.6 acres respectively. The 34.3 acres have been replaced through the implementation of the wetland mitigation project in the northernmost portion of the T30-1 shallow flood cell. Approximately 40 acres were seeded with native wetland plant species in 2007. This created wetland area has been increasing in cover and extent. Many of the individuals of each species are beginning to set seed. This area is rapidly recruiting more wetland vegetation by expanding southwest, with the seeds being dispersed by water flowing down gradient.

Table 17. Impacts to Various Habitat Types by Construction as Described in Various Environmental Documents

	Habitat Type (acres)			
Environmental Document	DAM	MAM	SAM	Shorebird Habitat
1997 EIR	91.6	0	0	0
Southern Zones MND	5.6	0	0	0
2003 SIP FEIR	87.2	27.7	6.6	0
Phase V MND	0.1	0	0	0
CDFG 1601 Agreement R6-2001-060				63
2008 SIP FSEIR	TBD	0	0	0
Total	**184.5**	**27.7**	**6.6**	**63**
***Acreages shown overlap with dust control areas but were not necessarily negatively affected by construction and operation*				

Operation of shallow flood laterals in T30-1 will continue to wash the previously bare playa of salts and reclaim the soils for further vegetation growth. Wetland vegetation will likely spread to the majority of the 692 acres in the T30-1 dust control cell except for the deeper portions of the tailwater pond in the southwestern section of the cell. These deeper portions of the tail-water pond have seen the recruitment of *Potamogeton* sp., aquatic and highly palatable waterfowl forage.

The objective of no net loss of riparian habitats will continue to be met by operation and maintenance of managed vegetation and continued development of the created wetlands mitigation site in T-30. DAM habitat values in managed vegetation will be maintained since habitat values are a function of dust control efficiency by way of vegetative cover. Wetland habitat values will be maintained and enhanced in the created wetland area through the process described above.

Furthermore, the amount of baseline aquatic habitat functions and values have increased substantially over the baseline period. Adjacent to Dirty Socks spring, 63 acres of shorebird foraging habitat were impacted by the Project. This habitat consisted of shallow water flowing from Dirty Socks seasonally when evaporation and transpiration rates were low and decreasing through summer. This ephemeral water source was not enough to reduce emissivity of the area and therefore dust control of this area was necessary. This habitat has been replaced by similar habitat that has water flow from October 1 to at least July 1 over an area of 153 acres. This habitat is located in T4-3 and is discussed further in Section 6.16. This water is available for foraging throughout most of the year.

Additionally, approximately 26 square miles of shallow flooding habitat have been created by the Project that has resulted in the wildlife use discussed in Section 4 of this plan and will be managed under its own objective below.

6.8. Manage Shallow Flood DCMs for Habitat Quality to Sustain Waterbird Nesting and Foraging Habitat While Reducing Water Use for Dust Control.

Actions will be performed to reduce water use while maintaining dust control efficiency. These actions will be congruent with waterbird habitat requirements where feasible. Water use will be reduced through construction of planned flow patterns favoring sheet flow and reducing channeling in shallow flood in order to better regulate the distribution of water. In many areas vegetation will be promoted to reduce fetch length and control dust.

6.8.1. Waterbird Nesting Habitat

The increase in vegetation within the Project area may attract additional nesting waterbird species. Vegetation types expected to be supported in the Project area are alkali meadow, wet meadow, and short-stature emergent vegetation. As vegetation develops, species such as Long-billed Curlew and Wilson's Phalarope, which are not known to currently nest in the Project area, may find suitable nesting habitat. Long-billed Curlew, a rare breeder in Inyo County, nested at Ash Creek on the west shore of Owens Lake in 1998 and has also recently nested in wetland areas east of Independence. Wilson's Phalaropes nest in Long Valley and Mono Lake to the north. The Long-billed Curlew prefers to nests in short vegetation (3-9 inches tall) and often close to (within 100-450 yards) standing water and Wilson's Phalaropes nest in grassy marshes adjacent to shallow waters. Black-necked Stilt and American Avocet will use areas with some vegetation for nesting sites, with Black-necked Stilt generally tolerating more dense vegetation than avocets. Virginia Rail and Sora nest primarily in freshwater wetland areas with dense vegetation and occur in wetland areas adjacent to the Project and may use emergent vegetation in shallow flood cells as it develops further. These waterbird species may make use of areas with vegetation similar to wetland habitat developing in T30-1 and other areas of wetland development in the Project area.

Waterfowl generally nest in vegetated areas, so the use of the Project area by nesting waterfowl is expected to increase with continued development of vegetated areas. Species which may breed in the Project area in relatively dense herbaceous or emergent vegetation include Gadwall, Cinnamon Teal, Green-winged Teal, and Mallard. With the wetland development already occurring in the Project area, several broods of Mallard and Gadwall have been noted the last few years (2008 and 2009). Ruddy Duck and Redhead prefer to nest in tall dense stands of emergent vegetation, which may possibly develop in the future.

6.8.2. Vegetation Development

During germination and growth trials by CH2MHILL and the District, it was determined that maximum soil or irrigation water conductivity for saltgrass germination and growth was 20 to 30 dS/m. Clumps of saltgrass may grow on the playa in areas with extensive salt crust, but appear to be established in these areas by runners from populations that are in less saline areas.

Sheet flow areas that do not receive recirculated brine water will become less saline over time as salts are leached from soils. Areas with lower salinity may develop conditions hospitable to vegetation establishment. Some shallow flood areas that receive freshwater have seen the establishment of various wetland plants including cattail (*Typha* spp.), sedge (*Carex* spp.), bulrush (*Scirpus* spp. and *Schoenoplectus* spp.), spikerush (*Eleocharis* spp.), rush (*Juncus* spp.), borax weed (*Nitrophila occidentalis*), and Yerba Mansa (*Anemopsis californica*) as well as occasional woody species including willow (*Salix* spp.) and cottonwood (*Populus fremontii*). Aquatic species including pondweed (*Potamogeton* sp.) and duckweed (*Lemna* sp.) have become common in some ponded areas. Pondweed, an important food for waterfowl, is abundant in the relatively fresh tailwater pond of T30-1. This vegetation not only provides cover but provides a diversity of foraging resources for waterbirds in the form of seeds, leaves, and roots as well as increased diversity of insects. The ultimate goal will be to create sufficient vegetative cover to maintain minimum dust control efficiencies.

Some locations in the Project area, directly adjacent to bubblers generally in the created wetlands (T30-1) have seen cattail establishment. Cattails have become more common in the T30-1 wetland mitigation area due to the fact that the bubblers in the wetland areas are operated year round for irrigation of the wetland mitigation area thus keeping the salinity in rhizosphere conducive to cattail persistence. Cattails have a lower tolerance for high salinity than most wetland plants (Kadlec and Smith 1989). Periodic drying in other sheet flow areas allows salts to return to the surface from groundwater by capillary action thereby increasing salinity above cattail and other wetland species tolerance.

In suitable areas, drill-seeding of native species and hand planting may be performed. Some of these areas may need additional grading or drainage infrastructure for successful vegetation establishment. These areas have yet to be identified but will be evaluated based on their soil type, soil salinity, gradient, groundwater depth, and groundwater salinity, among other factors. Potential shallow flood areas identified for vegetation enhancement will also be evaluated based on Snowy Plover use. Areas with high Snowy Plover use will be avoided where possible.

In order to facilitate seed germination throughout a given area irrigation will be such that the relatively saline playa soil decreases in salinity, which is what is occurring in shallow flood cells receiving freshwater. Salt tolerance during germination of most plants is relatively low. The germination tolerance for inland saltgrass seed however is quite high; this species can germinate with conductivity in the 20-30 mS/cm range. Inland saltgrass can persist and grow vegetatively with conductivity over 70 mS/cm. When vegetative cover has reached target levels for dust control, then irrigation will be refined in order to maintain cover and promote saltgrass.

6.8.3. Maintaining Vegetation

The salinity tolerance of many plants after establishment is much higher than what is needed during germination. Therefore, after the recruitment of vegetation into a given area, irrigation will be refined to conserve water while staying within physiological tolerance of various species, particularly saltgrass. Additional dry areas may also receive seeding of various shrub species including saltbush (*Atriplex* species), inkweed (*Suaeda moquinii*), and greasewood (*Sarcobatus vermiculatus*). Early irrigation to facilitate germination may increase the growth and establishment of hydrophytic species that may not persist throughout a given area. Irrigation creates a mosaic of saturated soils grading into drier areas with shallow ground water. Areas adjacent to bubblers and channels may have more hydrophytic vegetation such as bulrush. This mosaic will create a diversity of habitat where various species will develop based on differences in their ability to tolerate salinity and other soil characteristics.

6.8.4. Maintaining Foraging Habitat

Colwel and Taft (2000) found that large, shallow, and topographically variable wetlands had more species than did small, deep, and topographically simple wetlands. Further, Cowel and Taft suggested that "managers seeking to increase habitat diversity: 1) modify or create wetlands with variable topographic relief, 2) manage wetlands at shallower depths than practiced for waterfowl, and 3) maximize wetlands size." The average wetland depth when flooded was recommended to be less than 20 centimeters.

Shallow flood ponds are generally filled from one outlet, therefore it takes substantial time for a large acreage to flood completely and become dust control compliant. Due to this impediment, ponds may need to be leveled in such a way as to hasten the time frame it takes in order for a cell to become dust control compliant as well as reduce the volume of water required. This leveling will be to reduce average water depths. During this process of leveling small islands can be built to provide the topographic variability suggested by Colwel and Taft (2000). This operation will help use water efficiently and provide for increase habitat diversity.

Heavy equipment may be used to build berms to direct and impound water and remove channels formed by flowing water in sheet flow areas. Removing channels that have formed increases water use efficiency by removing preferential flow patterns. This returns the area to originally designed sheet flow which restores the shallow foraging habitat for shorebirds and waterfowl without deeper high-velocity water in channels.

6.8.5. Habitat Monitoring

Ongoing monitoring of dust control compliance currently involves frequent evaluation of land cover utilizing high resolution satellite imagery to assess conditions of saturation and vegetative cover (managed vegetation). This data can be evaluated to determine site suitability for Snowy Plover, shorebird, and waterfowl habitat based on extent of water distribution, available open playa for nesting, extent of ponding, and vegetative cover.

6.9. Monitor for and Control Noxious Weeds

Along with native vegetation, the potential for invasive species establishment exists. Saltcedar and other exotic plant species may reduce habitat quality for native wildlife by competing with native vegetation, providing foreign food sources, altering hydrology, or providing inappropriate structural components. Noxious weeds are exotic plant species defined by law or regulation and designated by the California Department of Food and Agriculture. Noxious weed species, such as saltcedar (*Tamarix ramosissima*) and Russian olive (*Elaeagnus angustifolia*) occur in the Project vicinity and implementation of the Project could potentially facilitate their expansion into the Project area. Saltcedar and perennial pepperweed (*Lepidium latifolium*) both listed as Noxious Weeds by California Department of Food and Agriculture, have germinated in some Project cells in areas with other developing vegetation.

LADWP initiated a Noxious Weed Control Program where any invasive species that are found are removed in an ongoing effort. Removal will be from an appropriate combination of mechanical, biological and chemical means. A final plan, entitled Noxious Weed Monitoring and Control Program developed per the 2008 SIP FSEIR was submitted to the District and

CDFG in October 2008. This document further defined noxious plant species with the greatest potential to occur in the Project area, and appropriate control methods. While other "exotic" plant species are known to occur in the Project area such as annual rabbitsfoot grass (*Polypogon monspeliensis*) and yellow sweetclover (*Melilotus officinalis*), these other species are considered to have low invasive potential, are not classified as noxious, and are not a priority for removal.

An exotic pest plant control program is implemented for the entire Project area, as applicable. Important details are given below.

- Measures used for control of exotic plants including Best Management Practices (BMPs) involving safe and prudent use of herbicides, brushing, direct weed removal, and other measures.
- Annual monitoring to ensure sufficient control of noxious weed species.
- Annual written monitoring reports documenting noxious weed location, type, pretreatment abundance, control type used, and control efficacy for submittal to the District, CDFG, and the CSLC.

This exotic pest plant control program is consistent with the County of Inyo General Plan (County of Inyo Planning Department, 2002) and the United States Fish and Wildlife Service Owens Basin Wetland and Aquatic Species Recovery Plan (USFWS 1998).

6.10. Manage Salinity Levels and Water Quality in Shallow Flood DCMs for a Productive and Diverse Invertebrate Community.

An understanding of factors contributing to productive and diverse invertebrate communities that provide waterbird foraging opportunities is necessary to guide the management of shallow flood DCMs. LADWP Watershed Resources staff will continue to work with Project operations staff to seek opportunities to maintain shallow flood areas suitable for wildlife.

Numerous surveys for invertebrates and evaluations of aquatic habitat were conducted at Owens Lake in the late 1990s (Eldridge and Lorenzen, 1995; Herbst, 1997, 1998, 2001a, and 2001b) and continue as part of Ecological Risk Screening in the Project area since 2001. One primary factor influencing aquatic invertebrate communities in shallow flood cells is water salinity.

CH2MHILL conducted water quality analysis at shallow flood areas and Herbst (2001b) conducted analysis at other outflow habitats. Salinity of aquatic habitats is measured and reported as electrical conductivity (EC) in various units including milliSiemens (mS) per centimeter (cm) (mS/cm), deciSiemens (dS) per meter (m) (dS/m) and, or TDS as g/L. Note that 1 mS/cm equals 1 dS/m. Conversions, where utilized in this document, are based on CH2MHILL calibrations developed for EC for Owens Lake water samples, which are only accurate on specific conductivity readings up to 140 mS/cm. Sampling by CH2MHILL included surface water samples from the shallow flood area and tailwater samples from tailwater pumps taken in 2002 and 2003.

Native habitats at Owens Lake range from fresh water habitat (less than 3.6 g/L), brackish water habitat (3.6 to 19.2 g/L), saline water habitat (9.2 to 104.2 g/L), and hypersaline habitat (greater than 104.1 g/L). TDS at natural well outflows reported by Herbst (2001b) ranged from 1.7 g/L to 14.2 g/L. The brine pool generally has TDS in excess of 260 g/L. As such, it does not generally support invertebrate production.

The range of TDS measured in shallow flood cells during 2008 sampling ranged from approximately 0 g/L to 120 g/L. The indications are that in general, salt balance within the shallow flood is driven by the mass of salt in the groundwater or soil. Figure 26 shows TDS distribution over various DCA cells sampled during May 2005 and June 2008.

The aquatic invertebrate community varies along this salinity gradient. Invertebrate diversity is relatively high in freshwater areas. The maximum productivity of invertebrates in these areas is in the range of 15 to 20 mS/cm. Invertebrate diversity decreased with increasing salinities however invertebrate diversity is maintained at high levels of salinity, up to 20 mS/cm (Herbst 2001b).

While invertebrate diversity is highest in the low salinity areas, invertebrate productivity and density is highest in areas of moderate salinity. The two most abundant species of invertebrates found in shallow flood habitat are brine flies, with *Ephydra auripes* preferring lower salinities and *E. hians* becoming more dominant with increasing salinities (Herbst 2001b). The greatest density of brine flies was observed when salinity was in the range of 25-100 mS/cm (Herbst 2001a). Given the salinities of shallow flood, and the relative abundance of the brine flies, these two species are most significant ecologically to the productivity of this habitat on Owens Lake, and as a waterbird foraging resource.

In hypersaline areas with specific conductance over 100 mS/cm, few *E. hians* and some individuals of a biting midge (*Culicoides* sp.) were found. At salinities over 100 g/L, *E. hians* was unable to reproduce in laboratory trials; salinities above 150 g/L eliminated brine flies (Herbst 1997).

Perennial habitat was found to produce better habitat conditions for abundant and diverse invertebrate resources. This is particularly important for habitat in lower salinity ranges. Colonization of available habitat in experimental tanks on Owens Lake playa was rapid in spring but colonization also occurred in fall (Herbst 1997).

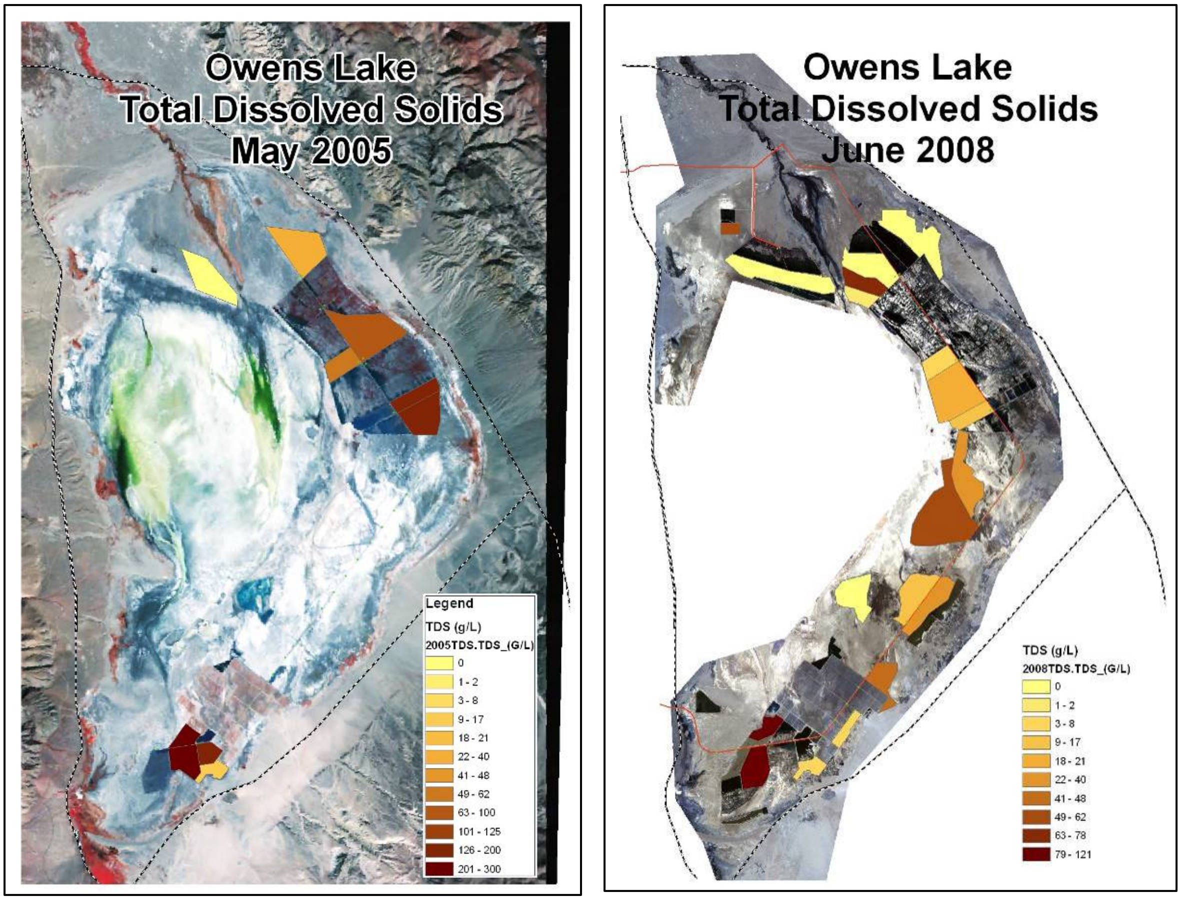


Figure 26. Gradient of Total Dissolved Solids (g/L) in Water Samples from 2005 and 2008 Monitoring

6.10.1. Salt Management

There are two major components contributing to the salinity of water in each DCM cell. The first component is the salt in the soils and groundwater. As discussed in Section 2, Baseline Resources, the salinity of the groundwater varies depending on the location on the lakebed. As one moves away from the highly saline brine pool, groundwater and soil salinity typically decrease. The other component contributing to salts in a particular DCM cell is dissolved solids in water moving into or out of ponds.

Future management measures include the use of fresh water from the LAA to flush salts from some shallow flood areas in order to support the development of native vegetation. This action will enhance dust control efforts while modifying water consumption. As the movement of dissolved solids is down gradient to lower elevation ponds, the expected outcome is that there will be continued variability in salinity across shallow flood areas. The most saline areas on Owens Lake currently are those closest to the brine pool and also lowest in elevation. These cells will likely experience a build-up of salts over time. As salts accumulate, some ponds may become too saline for brine fly production. Along with salts, other metals may become concentrated in these ponds, as discussed previously. These salt sink ponds would have low habitat value but would function to help maintain the salinity range of other areas. Since aquatic invertebrate productivity would be low in these potentially hypersaline ponds, the accumulation of heavy metals is not expected to increase exposure to wildlife. A salt management model is currently being developed to track trends and predict changes in salinity.

The benefit to wildlife from this operation is that areas higher in elevation will become increasingly less saline with continued freshwater input. These fresher areas will also allow vegetation to colonize and potentially increase habitat diversity and available food resources. These relatively fresh areas will provide a freshwater source for waterfowl using Owens Lake to maintain osmotic balance, support a more diverse array of aquatic invertebrates than more saline cells, and provide a source of aquatic vegetation and seeds for migratory and wintering waterfowl.

Given the effect of salinity on aquatic invertebrate communities in the Project area, salinity (or specific conductivity) values in the range up to 100 mS/cm will support diverse and abundant food supplies. Individual cells will be fresh, brackish, saline or hypersaline allowing for diverse salinity ranges and aquatic resources for wildlife.

6.10.2. Non-dust Control Season

Despite the reduction of water applied to shallow flood after the dust control season, ponds continue to provide suitable foraging and resting conditions for migratory waterbirds. Many ponds persist until water is again applied in late August or September (Figures 25-27). This pond persistence provides a refuge for brine flies and other invertebrates during the non-dust season. When dust season resumes in fall, adults can then repopulate once dry areas of shallow flood and re-establish the aquatic invertebrate community.

Operations may consolidate water into deeper ponds in order to reduce evaporative surface area. This action will typically keep these consolidation ponds fresher than if water was allowed to evaporate (and concentrate dissolved solids) without augmentation.

6.10.3. Vector Control Program

Field investigations were performed by mosquito entomologists from the University of California, Davis at District shallow flooding test sites and natural ponds, as well as seeps and springs areas around Owens Lake to determine the potential for water-based control measures to create mosquito-breeding habitat (Eldridge and Lorenzen 1995).

These investigations concluded that the lake bed had limited potential to develop mosquito habitat, but could occur when water depths range from 2 to 20 inches and when water had essentially no movement. Breeding of mosquito species is also constrained by salinity with breeding not supported when salinity was above 7 g/L (Eldridge and Lorenzen 1995).

The 2008 SIP FSEIR requires LADWP to institute a program on behalf of the residents of Swansea, Keeler, Cartago, and Olancha, whereby windows of existing residences within 3 miles of a water-based dust control area would be screened or other insect control devices would be provided to reduce nuisance insect populations.

The monitoring and control of mosquitoes and other biting insects are performed by Inyo County Mosquito Abatement. The primary emphasis of this program is to reduce the potential mosquito-borne disease transmission, including the West Nile Virus and the mitigation of nuisance conditions to surrounding communities from mosquitoes and other biting insects as a result of Project construction and operation.

6.11. Maintain a Baseline Population of 272 Snowy Plover

The Western Snowy Plover has a significant breeding population on Owens Lake. These shorebirds nest and forage in and adjacent to shallow flood DCMs. LADWP will maintain a breeding population of at least 272 adult Snowy Plover, which is the number of adult plovers present in 2002, and has been defined as baseline population. The breeding population of Snowy Plover is documented during annual lake-wide Snowy Plover counts.

The Snowy Plover that breed at Owens Lake are migratory, spending the winter and non-breeding season along the Pacific Coast. Snowy Plovers show a high degree of breeding site fidelity, with some intersexual difference in return rate. Site fidelity among males is generally higher than for females. At Mono Lake, Page et al. (1983) found that 77.8% of males and 44.9% of females returned to the area to breed in successive years. While this numerical difference may be due in part to lower detect rates of females, Paton and Edwards (1996) found that males are more likely to return to the same breeding site year-to-year. Paton and Edwards (1996) also found that the return rate of females was a function of nesting success the previous year at the site. Nest success can be affected by factors such as habitat quality including potential nest site opportunities and location of suitable foraging areas, predation rates, weather, and nesting season disturbances.

Due to the migratory nature of this species, events may happen on the wintering grounds or along the migratory route that may influence the Snowy Plover population at Owens Lake. The number of Snowy Plover has increased above baseline numbers since the onset of shallow flooding. While the amount of nesting habitat (open playa) has decreased by being converted to shallow flood, the value of the existing nesting habitat has increased substantially due to its proximity to water. Since Snowy Plover preferred nesting habitat at Owens Lake is described as barren areas within 0.5 miles of water, much of the suitable pre-project nesting substrate was likely too far away from water to have been successfully used. The amount of foraging habitat at Owens Lake has increased significantly with sheet flow shallow flood and the associated brine flies for forage.

A population of at least 272 adult Snowy Plover is expected to be maintained through the continued implementation of Snowy Plover mitigation measures and operation of shallow flood dust control measures.

6.11.1. Snowy Plover Protection Measures

The impact avoidance and minimization measures described above include speed limits and road closures, the lakebed worker education program, Snowy Plover clearance surveys, Snowy Plover nest buffers, Corvid Management Program, and Snowy Plover habitat flows. In addition the maintenance of the 1,000-acre shorebird and Snowy Plover habitat, and maintenance of the 145 acres habitat shallow flood area will also provide various forms of protection to the breeding population of Snowy Plover and their habitat. The increase in habitat combined with the many Snowy Plover impact avoidance and minimization measures provide substantial protection for the Snowy Plover population.

In the unlikely event that the number of Snowy Plover falls below baseline, the reason for the decline will be evaluated and addressed. This evaluation will assess any changes in local conditions of shallow flood areas including increases in vegetation, water quality parameters, or water levels as well as trends in Snowy Plover populations at other sites and other factors out of LADWP control. The possible influence of increased predation risk will be assessed as the populations of common predators including California Gull and Common Raven are evaluated. Additional monitoring of factors influencing nest success, adult survival, or habitat quality may be considered if significant continued population declines occur.

6.12. Maintain a Hydrologic Regime for Snowy Plover to Complete their Nesting Cycle

Water application will continue to meet regulatory requirements ensuring that the appropriate percent of the ground surface is saturated for dust control compliance which provides foraging habitat for Snowy Plover as discussed previously.

6.12.1. Snowy Plover Habitat Management Flows

PRBO recommended in their 2002 Snowy Plover Annual report that LADWP “consider tapering water flow down gradually in shallow flood areas if large numbers of nesting birds or broods are found at the end of the dust control season…” This recommendation was incorporated in the 2003 SIP EIR with Measure Biology-14. This satisfied PRBO’s concerns and has avoided impacting Snowy Plover nesting.

Additionally, operation of the shallow flooding DCM has extended the Snowy Plover nesting season later into the summer than before the dust control project was implemented (Ruhlen, Page, and Stenzel 2006), further benefiting the Snowy Plover population.

The 2008 SIP FEIR (District) has an additional requirement that the Snowy Plover surveys are conducted within seven days of planned shutdown. This requirement was added to the Phase 7 DCMs with no reasoning behind the additional necessity compared to Phase 5 DCMs constructed under the 2003 SIP. In fact, the Phase 7 shallow flood DCMs will have a relatively large proportion of ponding shallow flood which will stay inundated much longer than sheet flow shallow flooding lessening the need for slow shut down of laterals.

Additionally, the first phase of shallow flooding (which at that time was only sheet flow and very little ponding) implemented under the 1997 SIP EIR found that at the end of dust control season "there would be no direct or indirect impacts on wildlife resulting from the sudden loss of foraging habitat during the breeding season for shorebirds. Therefore no mitigation would be required."

The mitigation measure for Snowy Plover habitat flows was developed before the locations of Snowy Plover in shallow flood areas were understood. Snowy Plover use of the shallow flood cells has been similar over the last several years. Due to the large proportion of ponds in shallow flood and gained knowledge of Snowy Plover site fidelity, LADWP proposes to operate the dry down of shallow flood as described below.

The Snowy Plover annual surveys performed late May into June will be used to identify shallow flood cells with no Snowy Plover use that can be shut down at the immediate end of dust control season. If Snowy Plover are found in a sheet flow shallow flood cell, then an additional survey will be performed to look for nests or broods within 7 days of planned shut down. Cells will also be shut down if no Snowy Plover nests or broods are found. Shallow flood cells in which a majority of the surface area consists of ponded water will have the few laterals turned off (if there are any) at the end of dust control season since the large area of ponded water will persist for Snowy Plover nests or broods that might be in the area.

If Snowy Plover habitat maintenance flows are necessary in sheet flow areas due to the presence of Snowy Plover nests or broods, shallow flood lateral lines shall be slowly turned off from July 1 to July 21 to allow Snowy Plover to complete their nesting cycle. A diagram of Snowy Plover habitat management flows is presented in Figure 30.

Snowy Plover numbers and locations have been similar through the most recent years of annual monitoring. In years where no annual Snowy Plover count is required, the most recent year's survey will be used to determine if a shallow flood cell can be shut down on July 1 or if subsequent surveys are required to forgo Snowy Plover habitat maintenance flows. While the distribution of Snowy Plover may change somewhat with the increase in shallow flood acreage after Phase 7, there will be 5 continuous years of annual Snowy Plover counts to verify Snowy Plover site fidelity and understand use of the new Phase 7 shallow flood sites.

Snowy Plover chicks are mobile within hours of hatching and while they cannot fly for approximately one month, they have the ability to move substantial distances on foot while foraging for insects. Snowy Plover broods move up to 2.5 km (1.55 miles) at the Point Reyes National Seashore (Ruhlen et al. 2003). Furthermore water will persist after application ceases or slows. Images from early July (Figure 27) through mid-July (Figure 28) show significant standing water persisting in shallow flood areas, including the cells that did not need Snowy Plover habitat flows. Even after complete water application shut down of all shallow flood laterals on July 22, substantial standing water is maintained through August, which is the end of Snowy Plover nesting season (Figure 29).

6.12.2. Snowy Plover Habitat Management Flows during the Shoulder Season

In order to conserve water resources, after April 1, 2010, areas requiring 99% minimum dust control efficiencies (MDCE) will have lower wetness requirements during the spring shoulder season. The new wetness requirements will be as follows:

- From October 16 of every year through May 15 of the next year, shallow flooding areas with 99% MDCE shall have a minimum of 75% aerial wetness cover.
- From May 16 through May 31, shallow flooding areas with 99% MDCE shall have a minimum of 70% aerial wetness cover.
- From June 1 through June 15, shallow flooding areas with 99% MDCE shall have a minimum of 65% aerial wetness cover.
- From June 16 through June 30, shallow flooding areas with 99% MDCE shall have a minimum of 60% aerial wetness cover.

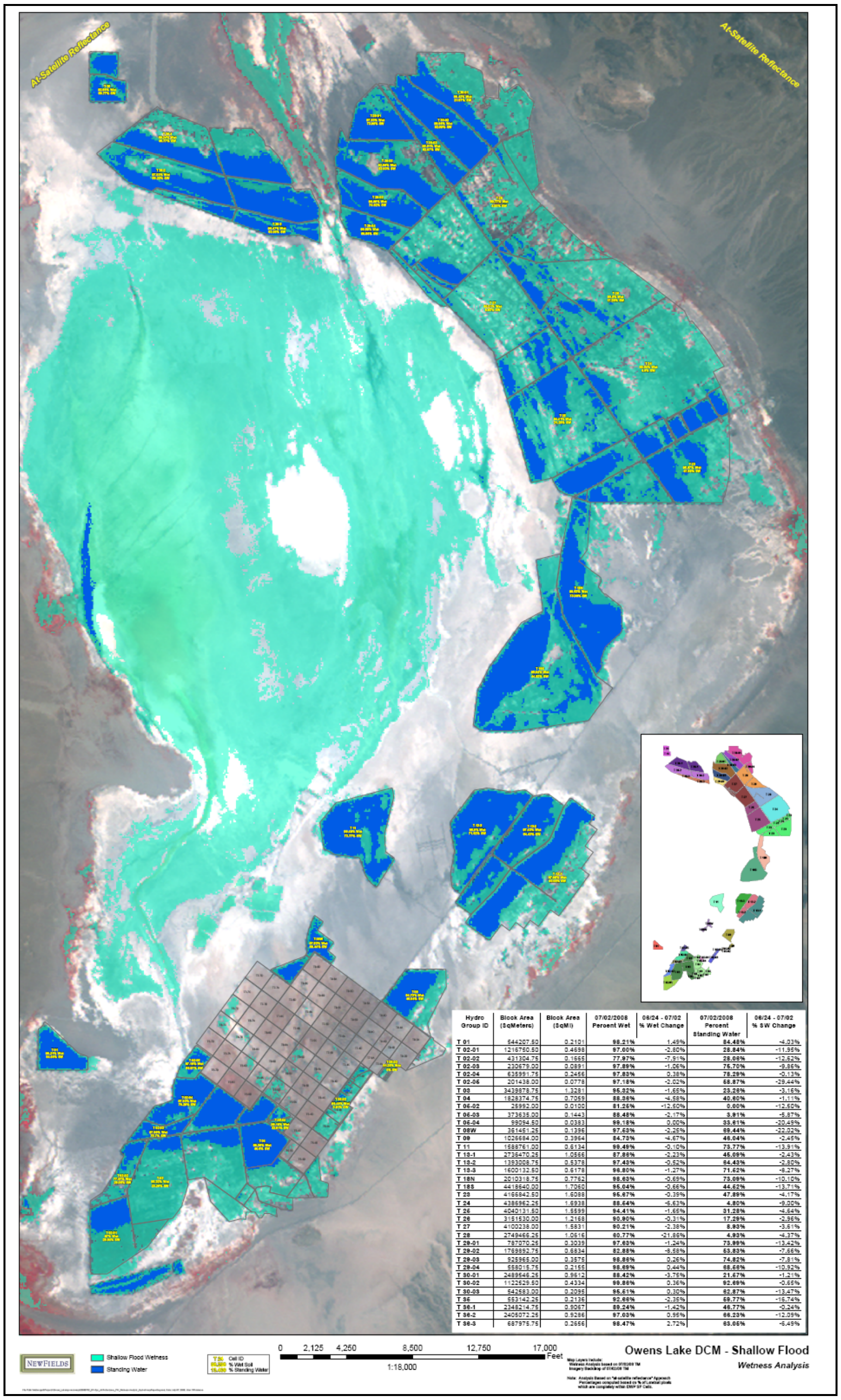
The last week of the dust control season in the shoulder season will likely be operating very similar to operations during the first week of Snowy Plover habitat maintenance flows. Therefore areas where Snowy Plover habitat maintenance flows are required, operations will shut down every other lateral that is in operation at that time. This could mean that, at most, only every fourth lateral is in operation (25% of the laterals in operation). On the second week of habitat flows, only the upper most lateral would be left in operation, with a full shutdown beginning on the third week of July (July 15).

6.12.3. Other Operational Constraints Regarding Snowy Plover Habitat

Given the small window for maintenance during the non-dust control season it may be necessary to dry certain areas during the dust control season in order to maintain, upgrade, or replace infrastructure. There are allowances made for emergency operations but occasionally actions must be taken in order to maintain, upgrade or replace infrastructure that may not meet the definition of an emergency, but is needed in order to better maintain dust control ability and avoid an emergency. This may mean drying of certain dust control cells during the dust season in order to access the area with heavy equipment. The shallow flood areas that are shut down will be in compliance with the needs for dust control with the approval of the District.

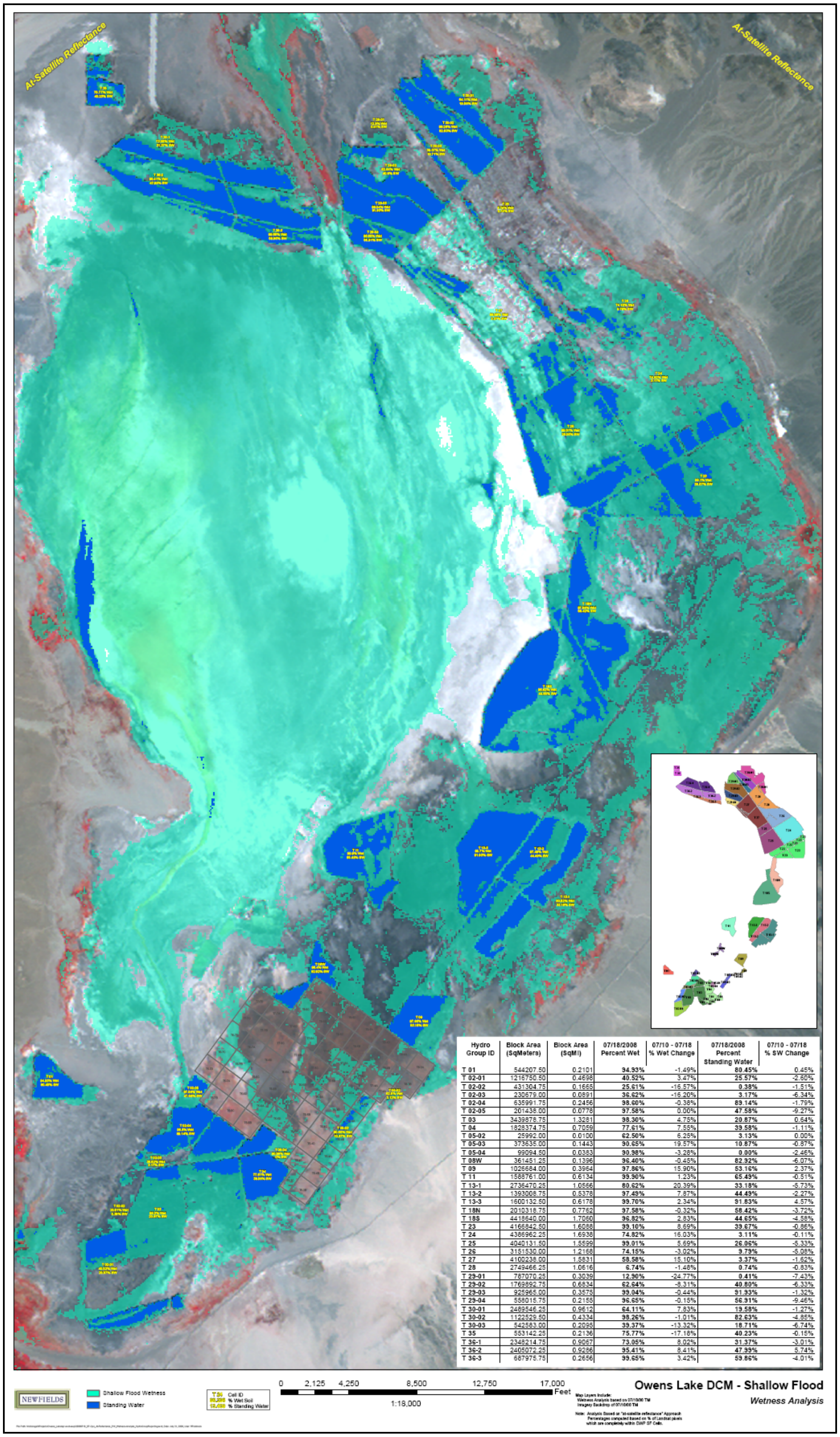
Maintenance will be performed during the non-breeding season of shorebirds and Snowy Plover when possible and practicable. The time frame when playa soils are normally the driest overlaps the end of the breeding season of shorebirds, in the end of summer. This may be the only time of the year in which it is feasible to access certain areas. When ground-disturbing maintenance activities occur during the shorebird breeding season, these areas will be surveyed for Snowy Plover and any nests will be marked appropriately with nest buffers.

Drying of large continuous areas will generally be avoided due to dust control concerns. When drying of an area occurs, the proximity of Snowy Plover nests to water will be evaluated. Laterals adjacent to Snowy Plover nests will be left on unless other water is nearby. Since Snowy Plover broods are mobile, water will not be left on if only broods are seen. Most areas would be closer than 0.25 miles to another water source. These distances are well within the distance a brood can travel. Furthermore, because the areas will not dry immediately small pools may persist for weeks, depending on the evaporation rate.



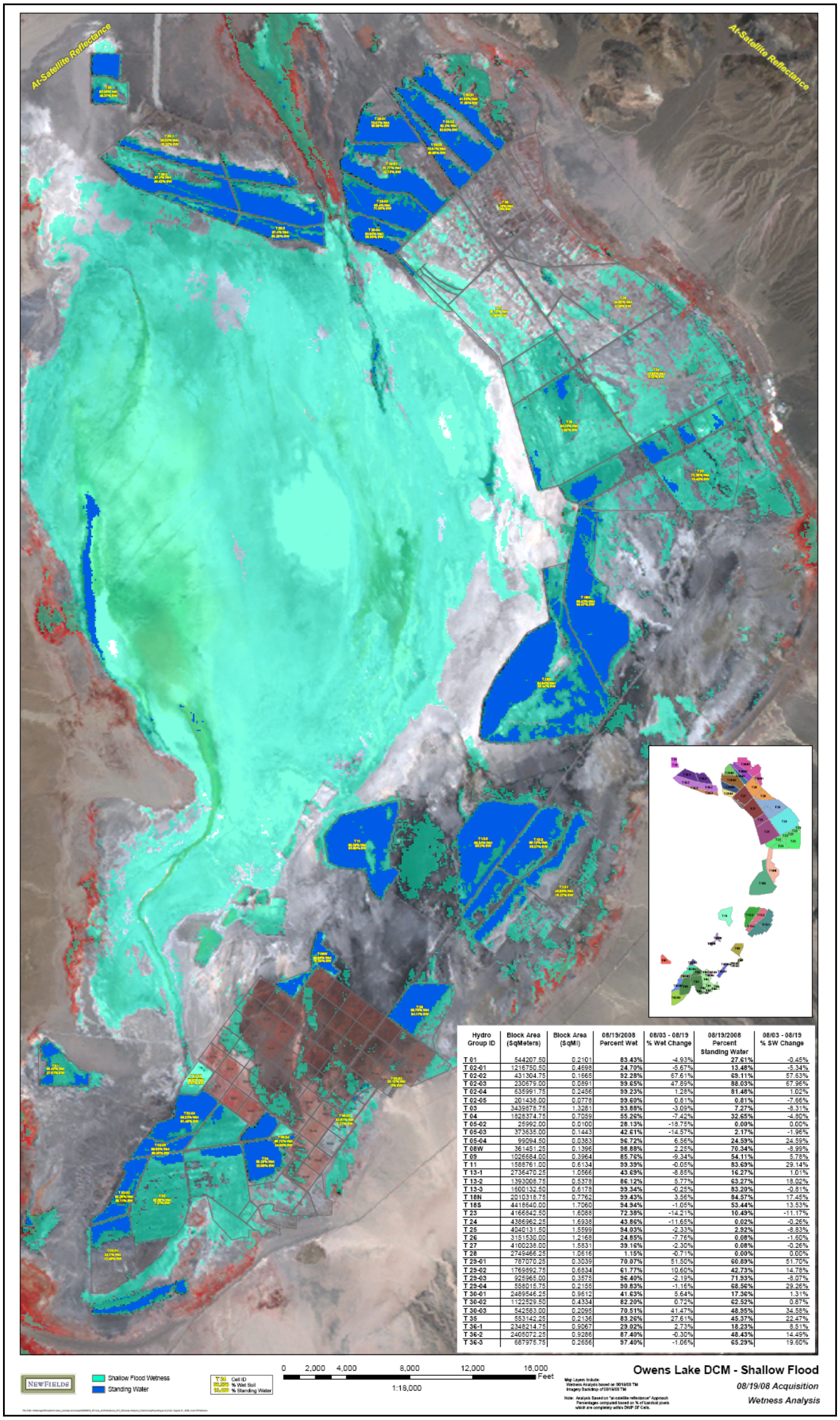
Hydro Group ID	Block Area (SqMeters)	Block Area (SqMi)	07/02/2008 Percent Wet	06/24 - 07/02 % Wet Change	07/02/2008 Percent Standing Water	06/24 - 07/02 % SW Change
T 01	544207.50	0.2101	98.21%	1.49%	84.48%	-4.03%
T 02-01	1216750.50	0.4698	97.00%	-2.80%	28.84%	-11.95%
T 02-02	431304.75	0.1665	77.87%	-7.91%	28.06%	-12.62%
T 02-03	230679.00	0.0891	97.89%	-1.06%	75.70%	-9.86%
T 02-04	635991.75	0.2456	97.83%	0.38%	78.29%	-0.13%
T 02-06	201438.00	0.0778	97.18%	-2.02%	68.87%	-29.44%
T 03	3439878.75	1.3281	95.32%	-1.65%	23.26%	-3.16%
T 04	1828374.75	0.7059	88.36%	-4.58%	40.60%	-1.11%
T 06-02	25992.00	0.0100	81.26%	-12.50%	0.00%	-12.50%
T 06-03	373635.00	0.1443	88.48%	-2.17%	3.91%	-5.87%
T 06-04	99094.50	0.0383	99.18%	0.00%	33.61%	-20.49%
T 08W	361451.25	0.1396	97.63%	-2.25%	69.44%	-22.02%
T 09	1026684.00	0.3964	84.73%	-4.67%	46.04%	-2.45%
T 11	1588761.00	0.6134	99.49%	-0.10%	73.77%	-13.91%
T 13-1	2736470.25	1.0566	87.86%	-2.23%	45.09%	-2.43%
T 13-2	1393008.75	0.5378	97.43%	-0.52%	64.43%	-2.80%
T 13-3	1600132.50	0.6178	98.80%	-1.27%	71.62%	-6.27%
T 18N	2010318.75	0.7762	98.63%	-0.69%	73.09%	-10.10%
T 18S	4418640.00	1.7060	95.04%	-0.66%	44.62%	-13.71%
T 23	4166842.50	1.6088	95.67%	-0.39%	47.89%	-4.17%
T 24	4386962.25	1.6938	88.64%	-6.63%	4.80%	-9.00%
T 25	4040131.50	1.5599	94.41%	-1.65%	31.28%	-4.64%
T 26	3151530.00	1.2168	90.90%	-0.31%	17.29%	-2.96%
T 27	4100238.00	1.5831	90.21%	-2.38%	8.93%	-3.61%
T 28	2749466.25	1.0616	60.77%	-21.86%	4.93%	-4.37%
T 29-01	787070.25	0.3039	97.63%	-1.24%	73.99%	-13.42%
T 29-02	1769892.75	0.6834	82.88%	-8.58%	53.83%	-7.66%
T 29-03	925965.00	0.3575	98.86%	0.26%	74.82%	-7.81%
T 29-04	558015.75	0.2155	98.69%	0.44%	68.68%	-10.92%
T 30-01	2489546.25	0.9612	88.42%	-3.75%	21.67%	-1.21%
T 30-02	1122529.50	0.4334	99.86%	0.36%	92.69%	-0.65%
T 30-03	542583.00	0.2095	95.61%	0.30%	62.87%	-13.47%
T 36	553142.25	0.2136	92.66%	-2.35%	59.77%	-16.74%
T 36-1	2348214.75	0.9067	89.24%	-1.42%	46.77%	-0.24%
T 36-2	2405072.25	0.9286	97.03%	0.95%	66.23%	-12.09%
T 36-3	687975.75	0.2656	98.47%	2.72%	63.06%	-6.49%

Figure 27. Shallow Flood Wetness on July 2, 2008



Hydro Group ID	Block Area (SqMeters)	Block Area (SqMI)	07/18/2008 Percent Wet	07/10 - 07/18 % Wet Change	07/18/2008 Percent Standing Water	07/10 - 07/18 % SW Change
T 01	544207.50	0.2101	94.93%	-1.49%	80.45%	0.45%
T 02-01	1216750.50	0.4698	40.52%	3.47%	25.57%	-2.60%
T 02-02	431304.75	0.1665	25.61%	-16.57%	0.38%	-1.51%
T 02-03	230679.00	0.0891	36.62%	-16.20%	3.17%	-6.34%
T 02-04	635991.75	0.2456	98.60%	-0.38%	89.14%	-1.79%
T 02-05	201438.00	0.0778	97.58%	0.00%	47.58%	-9.27%
T 03	3439878.75	1.3281	98.30%	4.75%	20.87%	0.64%
T 04	1828374.75	0.7059	77.61%	7.55%	39.58%	-1.11%
T 05-02	25992.00	0.0100	62.50%	6.25%	3.13%	0.00%
T 05-03	373635.00	0.1443	90.65%	19.57%	10.87%	-0.87%
T 05-04	99094.50	0.0383	90.98%	-3.28%	0.00%	-2.46%
T 08W	361451.25	0.1396	96.40%	-0.45%	82.92%	-6.07%
T 09	1026684.00	0.3964	97.86%	15.90%	53.16%	2.37%
T 11	1588761.00	0.6134	99.90%	1.23%	65.49%	-0.51%
T 13-1	2736470.25	1.0566	80.62%	20.39%	33.18%	-5.73%
T 13-2	1393008.75	0.5378	97.49%	7.87%	44.49%	-2.27%
T 13-3	1600132.50	0.6178	99.70%	2.34%	91.83%	4.57%
T 18N	2010318.75	0.7762	97.58%	-0.32%	58.42%	-3.72%
T 18S	4418640.00	1.7060	96.82%	2.83%	44.65%	-4.58%
T 23	4166842.50	1.6088	99.10%	8.69%	39.67%	-0.86%
T 24	4386962.25	1.6938	74.82%	16.03%	3.11%	-0.11%
T 25	4040131.50	1.5599	99.01%	5.69%	26.06%	-5.33%
T 26	3151530.00	1.2168	74.15%	-3.02%	9.79%	-5.08%
T 27	4100238.00	1.5831	58.58%	15.10%	3.37%	-1.62%
T 28	2749466.25	1.0616	6.74%	-1.48%	0.74%	-0.83%
T 29-01	787070.25	0.3039	12.90%	-24.77%	0.41%	-7.43%
T 29-02	1769892.75	0.6834	62.64%	-8.31%	40.80%	-6.33%
T 29-03	925965.00	0.3575	99.04%	-0.44%	91.93%	-1.32%
T 29-04	558015.75	0.2155	96.65%	-0.15%	56.91%	-9.46%
T 30-01	2489546.25	0.9612	64.11%	7.83%	19.58%	-1.27%
T 30-02	1122529.50	0.4334	98.26%	-1.01%	82.63%	-4.85%
T 30-03	542583.00	0.2095	39.37%	-13.32%	18.71%	-6.74%
T 35	553142.25	0.2136	75.77%	-17.18%	40.23%	-0.15%
T 36-1	2348214.75	0.9067	73.05%	8.02%	31.37%	-3.01%
T 36-2	2405072.25	0.9286	95.41%	8.41%	47.99%	5.74%
T 36-3	687975.75	0.2656	99.65%	3.42%	59.86%	-4.01%

Figure 28. Shallow Flood Wetness on July 18, 2008



Hydro Group ID	Block Area (SqMeters)	Block Area (SqMI)	08/19/2008 Percent Wet	08/03 - 08/19 % Wet Change	08/19/2008 Percent Standing Water	08/03 - 08/19 % SW Change
T 01	544207.50	0.2101	83.43%	-4.93%	27.61%	-0.45%
T 02-01	1216750.50	0.4698	24.70%	-5.67%	13.48%	-5.34%
T 02-02	431304.75	0.1665	92.28%	67.61%	69.11%	57.63%
T 02-03	230679.00	0.0891	99.65%	47.89%	88.03%	67.96%
T 02-04	635991.75	0.2456	99.23%	1.28%	81.48%	1.02%
T 02-05	201438.00	0.0778	99.60%	0.81%	0.81%	-7.66%
T 03	3439878.75	1.3281	93.88%	-3.09%	7.27%	-8.31%
T 04	1828374.75	0.7059	55.26%	-7.42%	32.65%	-4.80%
T 05-02	25992.00	0.0100	28.13%	-18.75%	0.00%	0.00%
T 05-03	373635.00	0.1443	42.61%	-14.57%	2.17%	-1.96%
T 05-04	99094.50	0.0383	96.72%	6.56%	24.59%	24.59%
T 08W	361451.25	0.1396	98.88%	2.25%	70.34%	-8.99%
T 09	1026684.00	0.3964	85.76%	-9.34%	54.11%	5.78%
T 11	1588761.00	0.6134	99.39%	-0.05%	83.69%	29.14%
T 13-1	2736470.25	1.0566	43.69%	-8.85%	16.27%	1.01%
T 13-2	1393008.75	0.5378	86.12%	5.77%	63.27%	18.02%
T 13-3	1600132.50	0.6178	99.34%	-0.25%	83.20%	-0.81%
T 18N	2010318.75	0.7762	99.43%	3.56%	84.57%	17.45%
T 18S	4418640.00	1.7060	94.94%	-1.05%	53.44%	13.53%
T 23	4166842.50	1.6088	72.38%	-14.21%	10.49%	-11.17%
T 24	4386962.25	1.6938	43.86%	-11.65%	0.02%	-0.26%
T 25	4040131.50	1.5599	94.03%	-2.33%	2.92%	-8.83%
T 26	3151530.00	1.2168	24.85%	-7.76%	0.08%	-1.60%
T 27	4100238.00	1.5831	39.16%	-2.30%	0.08%	-0.26%
T 28	2749466.25	1.0616	1.15%	-0.71%	0.00%	0.00%
T 29-01	787070.25	0.3039	70.07%	51.50%	60.89%	51.70%
T 29-02	1769892.75	0.6834	61.77%	10.60%	42.73%	14.78%
T 29-03	925965.00	0.3575	96.40%	-2.19%	71.93%	-8.07%
T 29-04	558015.75	0.2155	90.83%	-1.16%	68.56%	29.26%
T 30-01	2489546.25	0.9612	41.63%	5.64%	17.36%	1.31%
T 30-02	1122529.50	0.4334	82.20%	0.72%	62.52%	0.87%
T 30-03	542583.00	0.2095	70.51%	41.47%	48.95%	34.58%
T 35	553142.25	0.2136	83.26%	27.61%	45.37%	22.47%
T 36-1	2348214.75	0.9067	29.02%	2.73%	18.23%	8.51%
T 36-2	2405072.25	0.9286	87.40%	-0.30%	48.43%	14.49%
T 36-3	687975.75	0.2656	97.40%	-1.06%	65.29%	19.60%

Figure 29. Shallow Flood Wetness on August 19, 2008

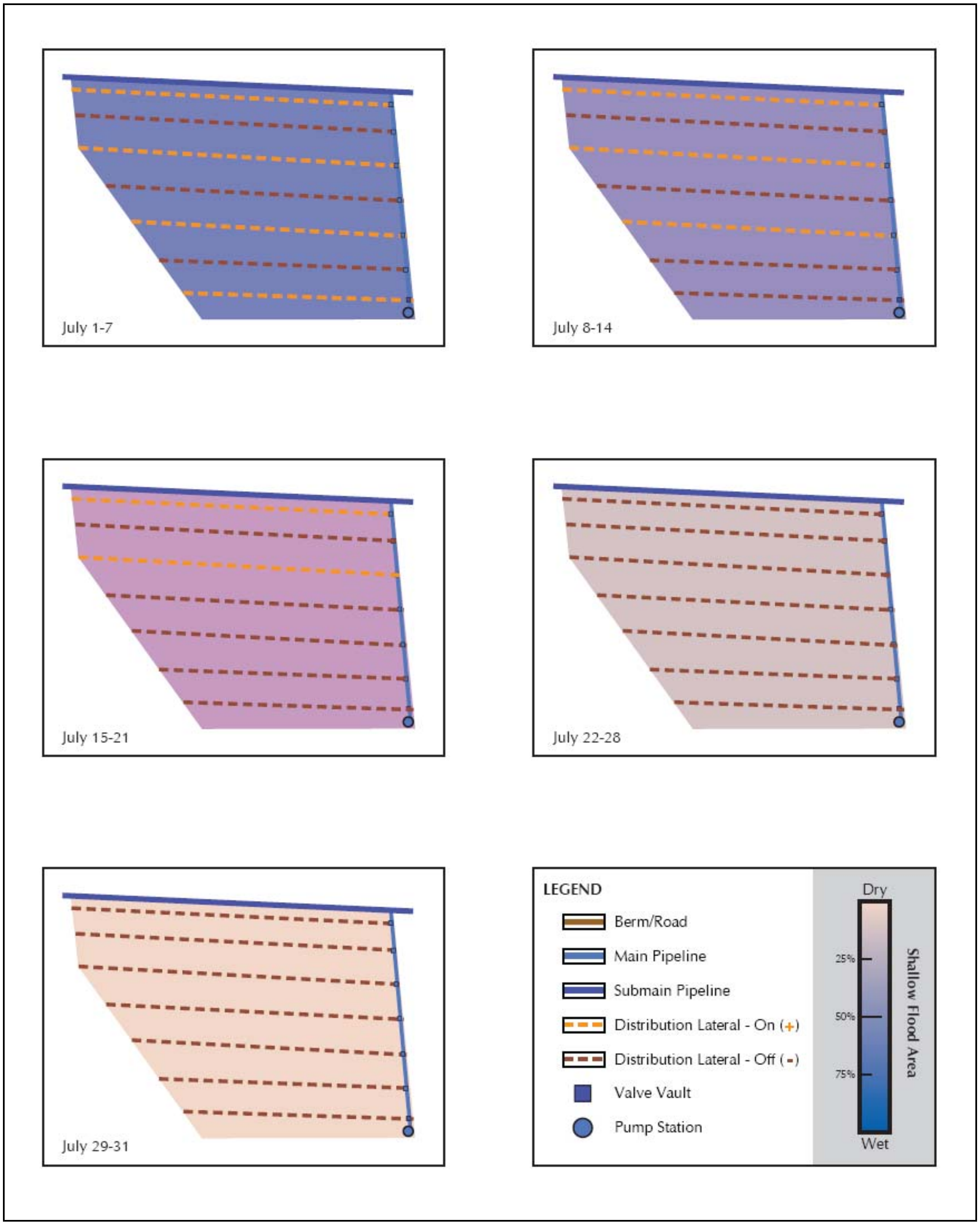


Figure 30. Snowy Plover Habitat Management Flows Diagram

6.12.4. Pond Shallow Flood Areas

At the end of the dust control season, water to the shallow flood DCMs is shut off, but ponded areas will persist and slowly decrease in size due to evaporation and infiltration. This pond drawdown results in the formation of islands that provide resting areas for migrating shorebirds and waterfowl. The newly exposed mudflats may also provide foraging opportunities for shorebirds. The contraction of ponds associated with the end of the dust control season corresponds with the arrival of fall migrant shorebirds including Wilson's Phalarope, Red-necked Phalarope, and Least and Western Sandpipers. Breeding shorebirds including American Avocet and Black-necked Stilt may also benefit from the numerous islands that form. Many ponds will persist until they begin filling again in late August or September (Figure 29). Despite the elimination of flow to ponds after the dust control season, the ponds continue to provide suitable foraging and loafing conditions for Snowy Plover and other migratory waterbirds.

6.13. Ensure that the Approximately 17.5 Acres of Proposed Dust Control Measures that are within California Department of Fish and Game Cartago Springs Wildlife Area are Compatible with the Designated Land Use. The California Department of Fish and Game has determined that Habitat Shallow Flood or Habitat Restoration would be Compatible with the Cartago Springs Wildlife Area's Designated Use.

There is currently no proposed construction of traditional DCMs in the Cartago Springs Wildlife Area. The portion of Cartago Springs Wildlife Area that was designated as emissive and needed dust control to bring the Owens Valley into attainment with the PM_{10} NAAQS is part of a large area in the southern part of Owens Lake. Only a portion of this area has been observed in the past to contribute to shoreline PM_{10} violations therefore only low levels of control efficiency are required to avoid violations as opposed to the 99% of most DCAs. Therefore, no DCMs are needed in the Cartago Springs Wildlife Area since the appropriate level of control can be obtained without utilizing that property.

The majority of the Cartago Springs Wildlife Area that was found to be emissive lies in what is referred to as the Channel Area. This area receives drainage that flows from south to north from Cartago Creek toward the brine pool. This area is typified by varying topography and scattered patches of DAM. The DAM in this channel area will be enhanced by increasing vegetative cover.

6.14. Enhance Existing Vegetation in the "Channel" Drainage Area

Adjacent to T2 is an area that currently drains storm water from the SW corner of Owens Lake that has been termed the "channel area". As part of this plan and the 2008 SIP FSEIR this area has been identified as an area to enhance the existing yet sparse vegetation stands. This area has been emissive in the past and is not targeted for actual dust control measures. By increasing the cover of existing vegetation stands emissions can be minimized and the attractiveness to wildlife can be increased.

Flow to the "channel areas" will be augmented from dedicated conveyance facilities with fresh to brackish water (EC<15 dS/m). Additional irrigation from shallow flood areas via controlled outlets and/or culverts or may also provide intermittent water. These irrigation pulses will be delivered seasonally and will be timed to key periods where the best potential for seed dispersal and plant growth. Flows will be supplied in brief surges and managed to maximize the wetted area. Seed of native plant species may be dispersed into newly wetted areas where plant stands are sparse. These species include, but are not limited to saltgrass and alkali pink (*Nitrophila occidentalis*). Where determined to be appropriate, natural seeding will be augmented using manually operated seeders to avoid disturbance to the surrounding drainage area therefore increasing the potential for seedling establishment. Water demands will vary depending on site specific conditions relating to topography, infiltration rates, water spreading potential, and evapotranspiration demands of target vegetation. If in the future vegetation coverage through irrigation pulses does not provide adequate dust control in the "channel area", additional efforts to increase vegetation through surface saturation will be implemented. Potential additional infrastructure may include installation of driplines, whiplines, and/or risers.

The effectiveness of irrigation pulses may be enhanced where necessary using diversion methods such as sandbags or check structures to expand wetted areas and surface flows toward existing vegetation stands and seeded areas. This approach is in lieu of mass grading and preserves the natural character of the site. LADWP is not guaranteeing that irrigation pulses will result in wetting of broad areas or that the full length of the "channel area" will be wetted. Actions will be implemented with the goal of enhancing the areas habitats without disturbing or impacting existing vegetation stands; as these stands will serve as the building blocks for vegetation expansion opportunities.

Goals and Objectives for Specific Areas

Certain cells that consist of shallow flood are managed as shorebird habitat. The goals for these areas are discussed below.

Designated Shorebird and Snowy Plover Habitat of 1000 Acres

6.15. Manage 1,000 acres in Perpetuity for Shorebirds and Snowy Plovers in Zone II in Consultation with the California Department of Fish and Game

Agreement requirements pertaining to designation of shorebird habitat in perpetuity are specified in Condition 9 of the Lakebed Alteration Agreement and in Condition 2(c) of the State Lands Lease. The language is summarized as follows:

- LADWP shall commit to setting aside and managing an area that will be dedicated as Snowy Plover and shorebird nesting and foraging habitat.
- Shallow flood operation as specified in the 1997 EIR, or other appropriate habitat, including habitat maintenance flows (flows will be from July 1 to July 21 [2008 District]).
- Maintenance of sufficient water quality to support brine flies and/or other aquatic invertebrates that in turn would support shorebird use.
- Maintenance of hydrologic regime suitable for Snowy Plover and shorebirds.
- Maintenance of minimum levels of vegetation, and means of vegetation control to keep it to a minimum.
- Maintenance of a 0.5-mile undeveloped buffer that should not contain predator perches.

This section discusses management of the 1,000-acre area designated for Snowy Plover and shorebird use (Designated Habitat) according to permit requirements. It presents management strategies to ensure that the 1,000-acre habitat will remain suitable for Snowy Plover and shorebird use.

6.15.1. Site Management

Submains for DCA cells T23E and T23W run along Sulfate Road, which divides the blocks; however, culverts beneath Sulfate Road provide hydrologic/operation continuity to the blocks across Sulfate Road. Laterals extend from Sulfate Road into the blocks. Water application in the blocks results in extensive ponding, more so than other portions of Phase 1 shallow flood. This is likely due to extensive clay soil deposits that limit infiltration beneath the area. Open playa with shallow surface pools is also present in the shallow flood area in T23. During operations, intermediate berms have been constructed throughout T23 to increase water distribution and surface saturation. Operations traffic accesses the block along Sulfate Road, Mainline Road, and the berm roads between adjacent blocks and around the exterior perimeter of T23.

6.15.2. Habitat Characteristics

As previously described, shallow flood cells T23E and T23W have extensive areas of ponding, as well as open shallow flooded playa. A substantial amount of water pools in downslope containment berms. Elsewhere within irrigation blocks, the grade varies from relatively flat to low-slope plain to areas with blocky hummocks, mounds, and heavy equipment tracks interspersed with basins. Figure 31 shows an aerial image of T23 at the end of shallow flood operations, illustrating habitat conditions. The area is adjacent to a number of seeps, spring mounds, and resource outflows on the eastern edge of the lakebed. Adjacent wetlands are associated with the historic Hutchinson Well, resource outflows from Swede’s Pasture Spring, and Sulfate Well East and West.

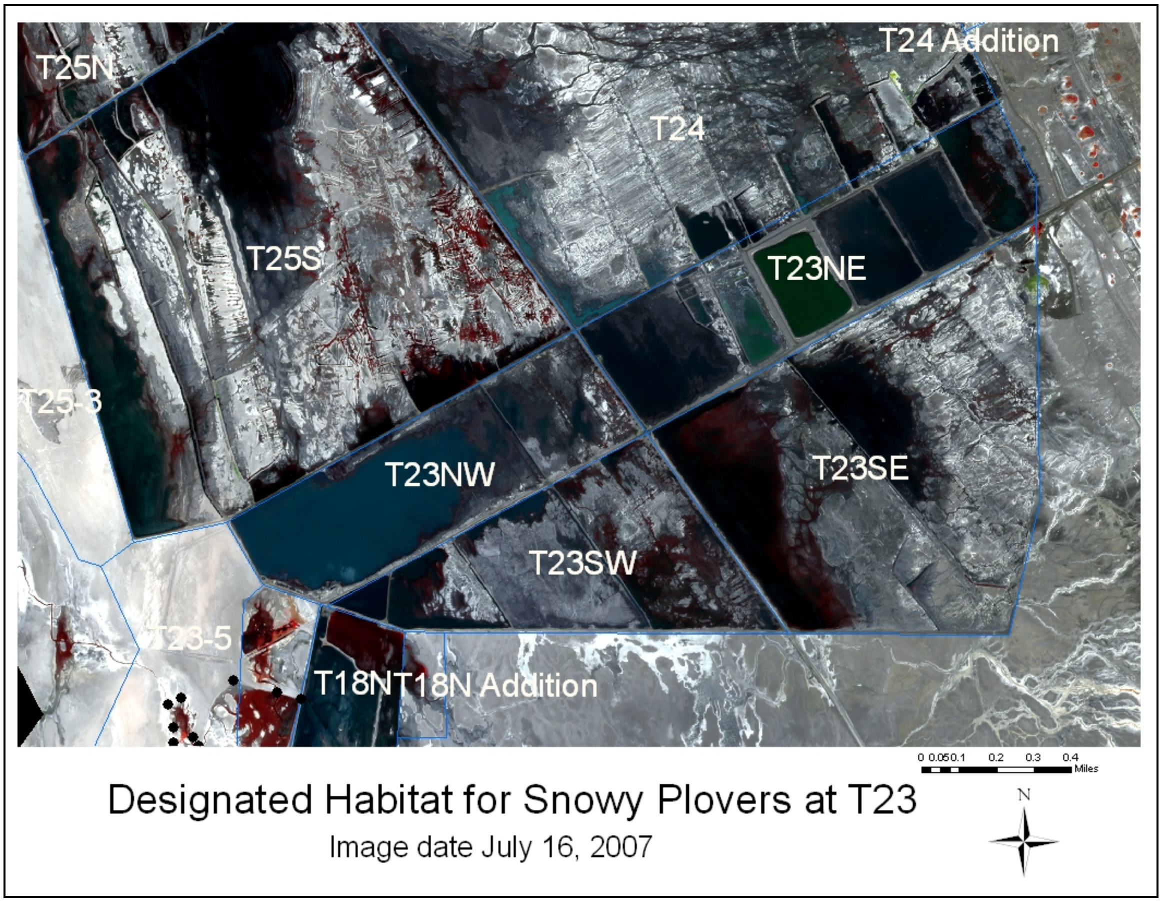


Figure 31. Designated Habitat for Snowy Plover at T23

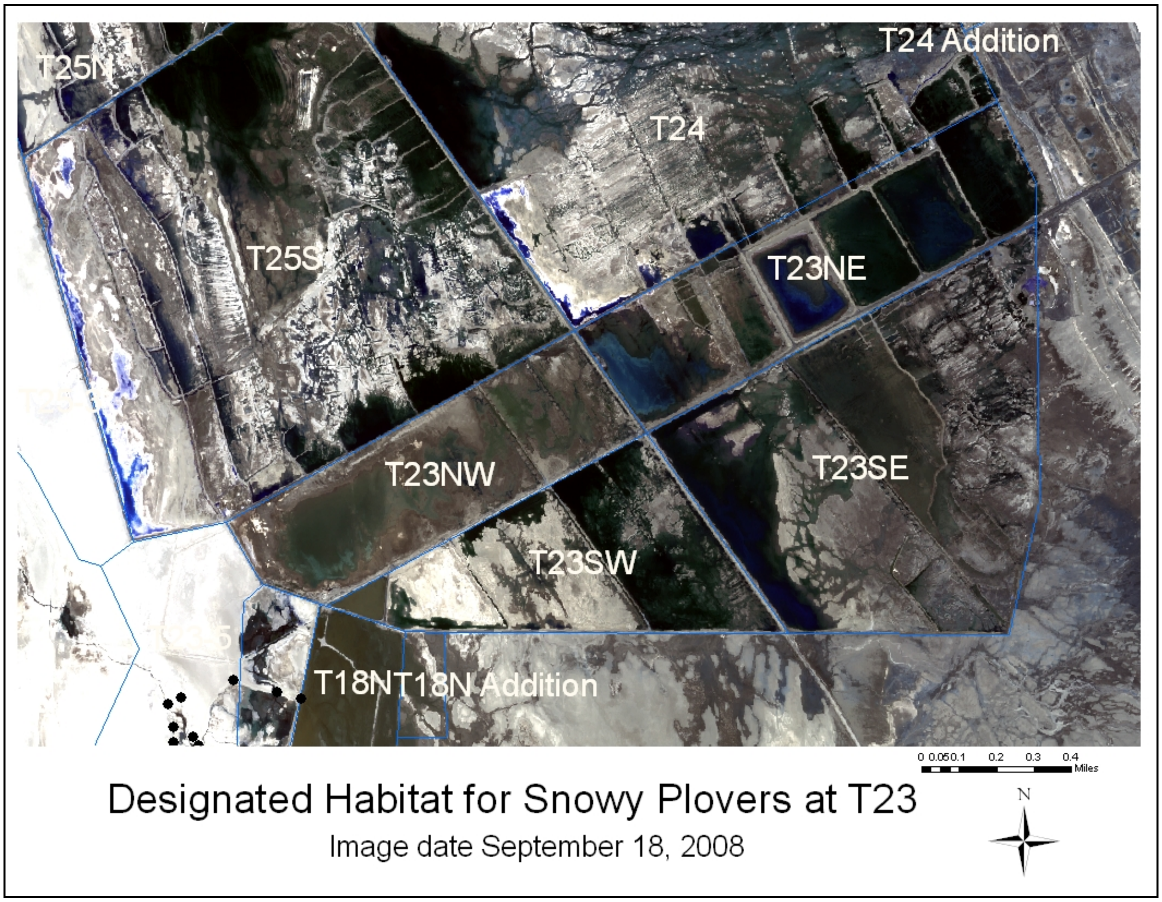


Figure 32. Designated Habitat for Snowy Plovers at T23

6.15.3. Habitat Use

<u>Snowy Plover Use</u>

A habitat management plan for the Zone 2 Shallow Flood Shorebird area was finalized in 2004. This plan was developed by CH2MHILL. It is unclear why these particular cells were designated other than shorebird use of the Zone 2 area taken as a whole has been consistently higher than other areas and these cells are part of the Zone 2 area as it was referred to at that time. Since the cells of the designated habitat area vary in their physical attributes, bird use among the cells has also varied.

The use of the habitat area by Snowy Plover has changed since 2002. The use of the area by plovers peaked in 2003, when 90 birds were detected during the lake-wide survey. The T23SW cell supported the highest density of Snowy Plover nests among all Zone 2 cells. Since 2003, the number of plovers detected in the habitat area has declined steadily, while lake-wide plover numbers have not. In 2009, only 10 plovers were detected in the habitat area. Among the T23 cells, the greatest number of plovers has been consistently found in the T23SE cell. From 2006-2009, this is the only cell in which plovers were seen during the annual survey. While this is the largest of the four cells, it also supports the greatest amount of sheet flow acreage and exposed playa and is also adjacent to Swede's Pasture, a natural spring outflow area that supported Snowy Plover before the Project.

The designated habitat area is also used by other shorebird species such as American Avocet and various Calidrid sandpipers such as Least and Western Sandpipers and Dunlin. Use of the area has been highest during spring migration. Over 3800 shorebirds have been seen within the designated habitat area on any one survey.

Early in the Project (2002 and 2003), T23 cells reportedly had some of the highest adult use and nesting densities for American Avocet of all Zone 2 areas, and high waterbird use. The number of avocets detected during the lake-wide Snowy Plover survey has varied from 57 to 474 birds from 2004 to 2009, with no clear pattern over time. T23 no longer has the highest use as other cells have attracted a greater proportion of avocets.

California Gull currently use the designated area throughout the spring, summer, and fall, while waterfowl have been seen primarily in fall or winter.

6.15.4. Area Operations

Water Regime

Application will continue to meet regulatory requirements ensuring that the appropriate percent of the ground surface is saturated. This will include a range of dry salt-crusted upland, saturated soil, and ponded water. Snowy Plover Habitat Management flows will persist between July 1 and July 21 each year.

Land Leveling

Modifications, such as land leveling and berm building may occur within the designated habitat area. This is likely to have only a minor effect on the suitability of the area as plover or shorebird habitat in the short term due to only localized operations. The long-term decrease in large expanses of open water and increase in small dry berms should enhance foraging and nesting habitat. Where feasible, this work will be performed outside the nesting season for Snowy Plover (March 15 to August 15). If ground disturbing work is to be performed in the area, preconstruction surveys will be conducted. Snowy Plover mitigation measures will be followed as described in the 2008 SIP FSEIR. Additionally, activities will be consistent with resource protection measures as described earlier

Brine Discharge

Infrastructure is currently in place to dispose of excess brine from the SZDCP managed vegetation to Zone 2 in the NSS. This represents the tailwater from soil leaching and irrigation of saltgrass plots, and brine discharge potentially could increase the salinity of irrigation blocks where it is applied. The discharge of brine into T23, where feasible, will be limited within water quality parameters necessary to provide suitable shorebird habitat, which will be determined with ongoing water quality monitoring.

Water Quality

Water quality as indicated previously may change over time, or may change with management actions. Suitability of habitat as plover nesting and foraging, or as suitability for other shorebird use, is dependent on water quality parameters. Maximum production of invertebrates, including brine flies, occurs in the conductivity range of 15-75 mS/cm (Herbst 2001b), although a broader range of salinities will support brine flies (up to 125 g/L) (Herbst 1997). The intermediate salinity range also supports the highest density of benthic algae.

Plovers have actively used and nested in the NSS in salinities ranging from 15 g/L to 95 g/L (measured as TDS in tailwater). This range apparently provides suitable tolerance limits for plover.

Salinity of surface water and tailwater measured from March to September 2003, the last time focused sampling was conducted, is presented in Table 17. The range of salinities is within parameters specified for shorebird forage production and high production of brine flies was observed throughout the area during operations. The maximum measurements were from samples taken during non-dust season and represent a time when no freshwater was being applied so salts were concentrated.

Table 18. TDS Measurements of Tailwater and Surface Water in Designated Habitat from March to September 2003

Irrigation	**Tailwater TDS (g/L)**		**Surface Water TDS (g/L)**			
Block	Mean	St Dev	Median	N	Minimum	Maximum
T23E (8N)	66.55	38.00	146.24	15	31.53	446.77
T23W (8S)	104.46	4 5.27	71.91	9	7.42	93.1

Ongoing water quality monitoring demonstrate if a significant change in salinity of surface water occurs, and remedial measures may be implemented accordingly to keep salinity within the range of optimal invertebrate production. The following remedial measures may be implemented if salt balance is outside these limits:

- In the unlikely event that salinity falls below optimal levels, a small amount of brine from operations in the Southern Zones Dust control may be added via the existing brine discharge line that is plumbed to T23.
- If salinity exceeds optimal levels, increasing fresh water input and decreasing tailwater input may reduce salinity. Tailwater may be removed to the brine line for discharge to other irrigation blocks or allowed to spill south to T18N.

Vegetation Control

Vegetation growth may reduce suitability of the 1000 acres to nesting plovers because this species nests in areas with little to no vegetation. Snowy Plover generally avoid areas with dense vegetation for foraging and nesting.

With conductivity below 30 dS/m, inland saltgrass may become established. If established, inland saltgrass may persist at much higher salinities. In addition, with conductivity readings below 15 dS/m, other wetland vegetation may be established. Currently, salinity conditions in T23 are unsuitable for the establishment of inland saltgrass or other wetland vegetation. In addition, extensive clay soils and extensive ponded water also may be inhibiting establishment of vegetation.

Where saltgrass or other vegetation begins to establish within the designated habitat removal will be evaluated for the nesting of Snowy Plover. If necessary the vegetation may be removed during the non-nesting season for Snowy Plover.

6.16. Manage 145 Acres of Habitat Adjacent to Dirty Socks Spring as Shorebird Foraging Habitat.

Pursuant to Condition No. 16 of the 2001 Streambed Alteration Agreement (Agreement No. R6-2001-060, page 5), the Project was expected to adversely impact 63 acres of shorebird foraging habitat at Dirty Socks Spring. Therefore, the City of Los Angeles Department of Water and Power was required to create 145 acres of Habitat Shallow Flood suitable for shorebird foraging.

This section discusses management of DCA cell T4-3 (152 acres) designated for shorebird foraging habitat. It presents management strategies to ensure that this shallow flood habitat will remain suitable for shorebird use. This cell began operation in 2003.

6.16.1. Site Management

Habitat Characteristics

DCA cell T4-3 consists of sheet flow shallow braided channels surrounded by saturated soils, as well as few areas of dry playa. The area is adjacent to an artesian well which feeds a spring seep complex called Dirty Socks. This area is surrounded by other areas of sheet flow and managed vegetation. The surface water applied drains into a large pond at T4-4. Figure 33 shows an aerial image of T4-3 at the end of dust season, illustrating habitat conditions as habitat maintenance flows were gradually reduced. When this dust control cell was constructed there were 48 Snowy Plover gravel islands created in the northern section. These gravel islands are various sizes and sum to approximately 2.9 acres. The gravel placed is of various sizes and is from 5 to 10 inches thick.

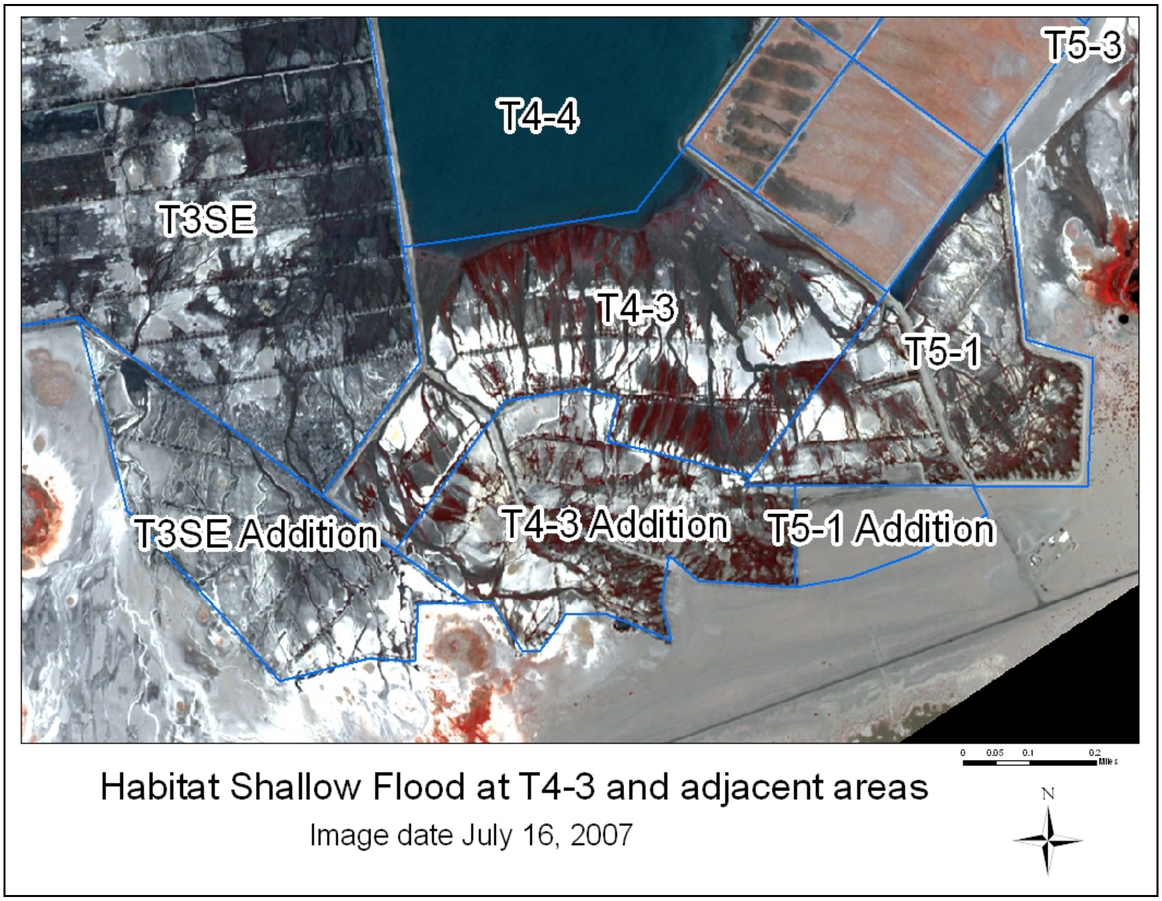


Figure 33. Habitat Shallow Flood at T4-3 and Adjacent Areas

<u>Habitat Use</u>

The area of T4-3 that receives the most use by various waterbirds is the northwestern portion of the block. This area is where the sheet flow water drains into the pond at T4-4. There is no berm separating the two cells. Many ducks prefer this area presumably for foraging and loafing. Many shorebirds have also been seen utilizing this area in large concentrations during migration. Over 50 species of birds have been observed utilizing this area over the many recent single-day surveys of the area.

<u>Snowy Plover Use</u>

The use of the habitat shallow flood area by Snowy Plover has changed since 2002 when only 6 birds were observed. The use of the area by plovers peaked in 2004, when 48 birds were detected during the annual Snowy Plover survey. Subsequently, the number of Snowy Plovers detected in the habitat shallow flood area has declined steadily, while overall lake-wide plovers have not. In 2009, only 4 plovers were detected in the T4-3 area. The reason for this decline is unknown but there are some contributing factors.

Since 2004 approximately 7000 acres of shallow flood have become operational that could provide better habitat where Snowy Plovers may have moved. Also this T4-3 area has a relatively large gradient from the highest southern portion to the tailwater pond. This has caused extensive channeling of water so that currently there are some areas that contain flowing water that is approaching two feet deep. These channelized areas are not used by Snowy Plover.

6.16.2. Area Operations

Water Regime

T4-3 receives water from six bubbler lines. Water applied will flow down gradient into T4-4 and is recirculated back to the above bubbler lines or into the brine-line for use in other DCMs.

The T4-3 cell receives flow-through water from both T4-3 addition and T5-1. This extra water and the relative steep gradient of the dust control cell tend to create areas where water forms channels instead of sheet flow. This increases water use substantially because it takes more water to saturate the soil for dust control compliance which in turn creates deeper channels. The only way to recreate the shallow braided channels conducive to dust control and to Snowy Plover use is to grade the area with heavy equipment. This is not always feasible due to operational constraints such as the inability to operate equipment in the dust control cell. This may cause a need to use sprinklers or whip lines to address dry areas to keep the area in compliance with dust control requirements.

Water application will continue to meet regulatory requirements ensuring that the appropriate percent of the ground surface is saturated. Snowy Plover habitat management flows may persist between July 1 and July 21 each year depending on Snowy Plover brood and nest locations.

Water Quality

The salinity of T4-3 and the T4-4 pond has been steadily decreasing over the past years. An intake in T4-4 pond (directly down gradient) draws water into the brine-line and with it dissolved salts. This water is used for irrigation of managed vegetation, which is the purpose of the design of T4-4 and T4-3.

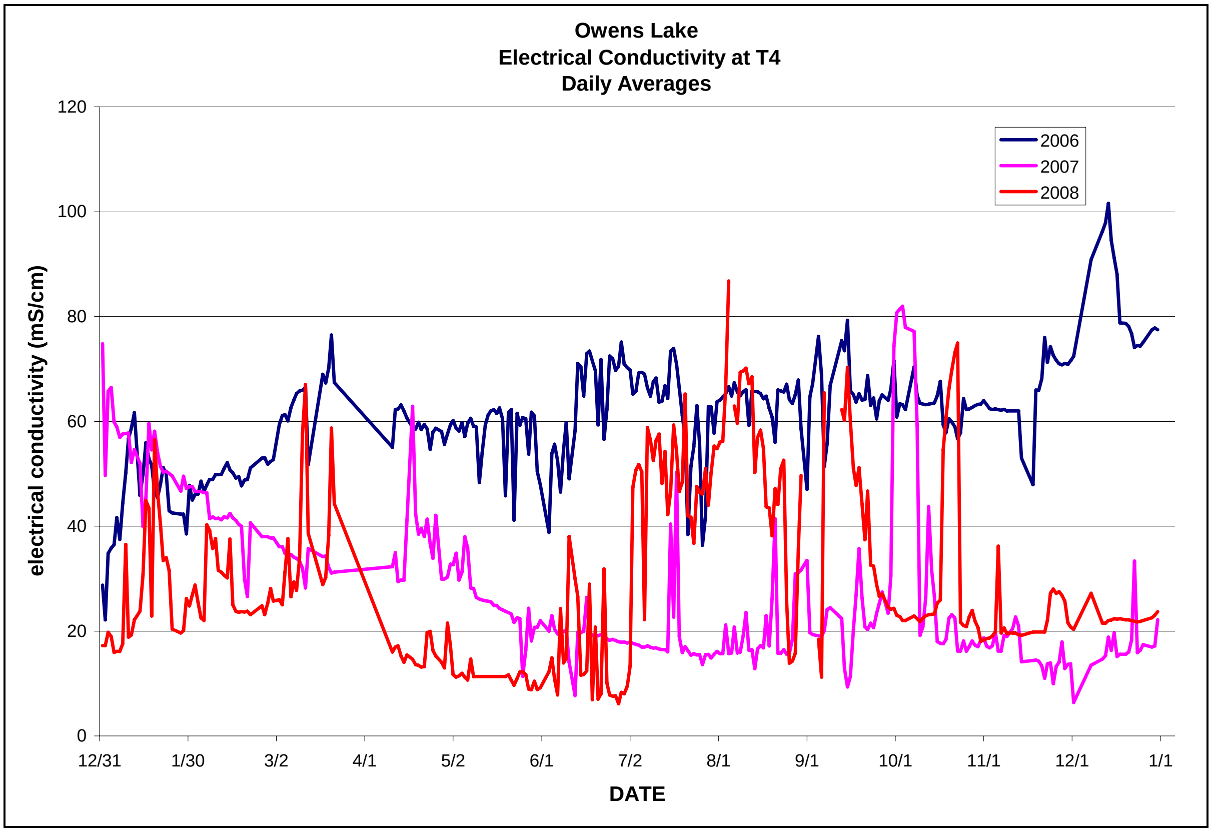


Figure 34. Daily Average of Electrical Conductivity Measurements at T4

Brine-line Operation

The brine-line operates to provide high salinity water to blend with fresh mainline water to achieve the appropriate salinity for irrigation of managed vegetation. The brine-line receives the majority of its high salinity water from the T4-4 operation pond. This constant withdrawal of salts has moved much of the salts out of the soil and water in T4-3 and T4-4. This decrease in salinity can be seen in the specific conductivity readings in Figure 34 during 2007 and 2008 in comparison to 2006. After Phase 7 construction other more saline areas will be accessible for charging the brine-line. This alternative water source may stabilize the salinity of the DCMs served by T4 laterals including T4-3.

6.17. Maintain a Minimum of 523 acres of Habitat Specifically for Snowy Plover Nesting

Concern has been expressed that the considerable increase of shallow flooding will decrease the amount of suitable nesting habitat for Snowy Plover at Owens Lake. This concern however, has not been substantiated. Snowy Plover numbers have consistently been above baseline numbers of 2002. Plovers have actively nested within shallow flood cells and even prefer it to dry playa given the proximity to water and insect forage.

Further, Sapphos Environmental, Inc, in a memo dated December 21, 2007, found:

> “The 523 acres has been determined to be the acres of historic snowy plover habitat. The specified acreage was determined using Sapphos Environmental, Inc.’s geographic information system (GIS) by taking the area between the 3,605-foot and the 3,595-foot elevation contour and dividing this

> value by 5 (2,614 ÷ 5 = 523). This represents an interpolated value of 12 inches above and 12 inches below the historic shoreline elevation (3,600 feet)."

The construction and operation of shallow flooding DCMs per the 1998 and 2003 SIP has increased Snowy Plover habitat to 34,359 acres from 16,161 acres before installation of shallow flood DCMs. With the Implementation of the 2008 SIP, 46,932 acres of Snowy Plover habitat would result (2008 SIP FSEIR), far above the "historic" Snowy Plover habitat of 523 acres determined above.

Nevertheless, LADWP agreed to provide 523 acres of habitat specifically in perpetuity for Snowy Plover nesting as mitigation for implementation of the 2008 SIP.

The area designated as Snowy Plover nesting habitat consists of 523 acres (not including vegetated areas within playa) located on the eastern shore of Owens Lake (Section 5, Figure 25). This area is bare playa adjacent to Phase 1 shallow flood and lake-fringing seeps for foraging habitat. This land is owned by the City of Los Angeles. Since this area is outside of a DCA, and there are no dust control maintenance activities required, project-related disturbances are lessened. This area has also had recent and historic use by nesting Snowy Plover.

6.18. Open Water Habitat

This section discusses management of the Designated Open Water Habitat (cell T30-2) designated as habitat for waterbird species that prefer to utilize ponds with open water. There is also a brief discussion of "focal" species identified in Measure Biology 14 (2008 SIP FSEIR) during baseline surveys (1995-1997) and current project use.

The first focal species described in Measure Biology-14 (2008 SIP FSEIR), the Eared Grebe, is the most abundant of the North American grebe species. Eared Grebe are closely associated with saline lakes and known to be able to exploit invertebrate resources found to be abundant in these habitats. Eared Grebes are now seen during spring and fall migration in shallow flood DCMs. Eared Grebes numbered over 4000 individuals during a survey conducted in fall 2008. Eared Grebe prefer shallow saline ponds or lakes. They obtain prey by both surface feeding and diving to feed off the bottom substrate, or by gleaning from submerged rocks and vegetation. Eared Grebes feed largely on aquatic invertebrates, and are known to feed heavily on brine shrimp at other Great Basin locations such as Mono Lake and the Great Salt Lake. At Mono Lake and other fall staging areas they feed largely in open water on free-swimming brine shrimp or on brine flies when foraging near shore. This species builds a platform nest adjacent to shallow water needed for escape when leaving the nest. At Crowley Lake and Bridgeport Reservoirs in Mono County they nest either within areas of emergent vegetation or on top of floating mats of aquatic vegetation on open water. Eared Grebe may potentially nest at Owens Lake, but have been found to use the Owens Lake and shallow flood areas to the greatest extent during migration. Brine shrimp are present in various shallow flood locations; however, alkali flies are a more abundant resource. Other aquatic invertebrate species are also available for foraging grebes.

Wilson's Phalarope, another species identified as focal under the deep-water habitat objective, was not seen in the Project area during the baseline surveys. This species is however, known to migrate through the area, and occurs as a rare breeder in Owens Valley. Like the Eared Grebe, Wilson's Phalarope are closely associated with saline environments, especially during migration. Wilson's Phalarope are currently known to be present at Owens Lake only during spring and fall migration and are currently not known to breed. During a fall

2008 survey, there were over 5,000 phalaropes counted consisting of both Wilson's and Red-necked Phalaropes. Wilson's Phalarope forage on aquatic as well as terrestrial invertebrates and are considered to be the most "terrestrial" of the phalarope species. At saline lakes, this species is known to feed primarily on brine shrimp and alkali flies. Wilson's Phalarope forage by pecking food from muddy substrates or the surface of water. They are also known for spinning in circles while swimming, although they tend to do this less frequently at major staging areas where food is abundant, such as at Mono Lake (Colwell and Jehl 1994).

California Gull were observed during baseline surveys in a couple of playa areas receiving water from lake-fringing seeps, outside of the Project boundary. There were no California Gulls seen in the Project area during baseline surveys. California Gulls have responded to the Project by an increase in numbers to over 13,000 during the spring migration period in 2008, with many birds residing in the area throughout the summer. These increasing numbers have generated concern that individuals may establish a breeding colony and prey on breeding shorebird broods and eggs. California Gull is not generally found in areas of deep or open water.

No Gadwall were seen in the Project area during baseline surveys; however 10 were observed in the Owens River Delta. In 2008, Gadwall were observed throughout the year and on every lake-wide survey, utilizing a variety of shallow flood cells. They have been most frequently encountered in the cells on the northern part of Owens Lake which are adjacent to the Owens River Delta, and are comprised of fresher water. In 2009, broods were observed within cells at the north end of the Project. No diving duck species, including the focal species Lesser Scaup, were observed in the Project area during baseline surveys. In 2008 Lesser Scaup were a very small component of the waterfowl community with the spring count totaling just over 60 individuals and one late fall count of about half that number. Ruddy Duck were also not seen in baseline surveys of the Project area. During an October survey in 2008, over 3000 Ruddy Duck were observed with half of those individuals found in cell T30-2.

6.18.1. Site Management

<u>Habitat Characteristics</u>

Cell T30-2 is a pond shallow flood cell in the north portion of Owens Lake (Figure 35). There is a sandy shallow bench towards the northeast containment berm that grades into deeper water on the southwest containment berm. Water depth at the deepest point may exceed 3 feet towards the down-gradient containment berm when the pond is operated at its highest elevation in late spring in anticipation of increased evaporation of summer or during low evaporation times of winter. Some small islands exist in the north side of the pond which become larger and more numerous when the pond elevation is lower in the non-dust control season.

<u>Habitat Use</u>

Most ducks are observed in the north portion of cell T30-2, utilizing the islands. Dabbling ducks can be seen foraging around and loafing on the small islands and diving ducks may be seen in the water nearby. Shorebirds consistently use the shallow areas close to the islands and adjacent to the northeastern containment berm. Eared grebes are found most commonly during migration in open water.

Area Operations

Water Regime

This pond exists on sandy soil and is filled by one outlet on the southwest corner of this cell with freshwater directly from the mainline. T30-2 may also receive water from T30-1 via the spillway during times of low evaporation. This pond is typically used as a consolidation pond during the non-dust control season by moving water from T30-1 to reduce surface area for evaporation. Salinity of the water is brackish but will vary seasonally depending on water application.

T30-2 will have some water year round since water generally will not have time to percolate or evaporate completely during the non-dust control season by the time filling is started in early August.

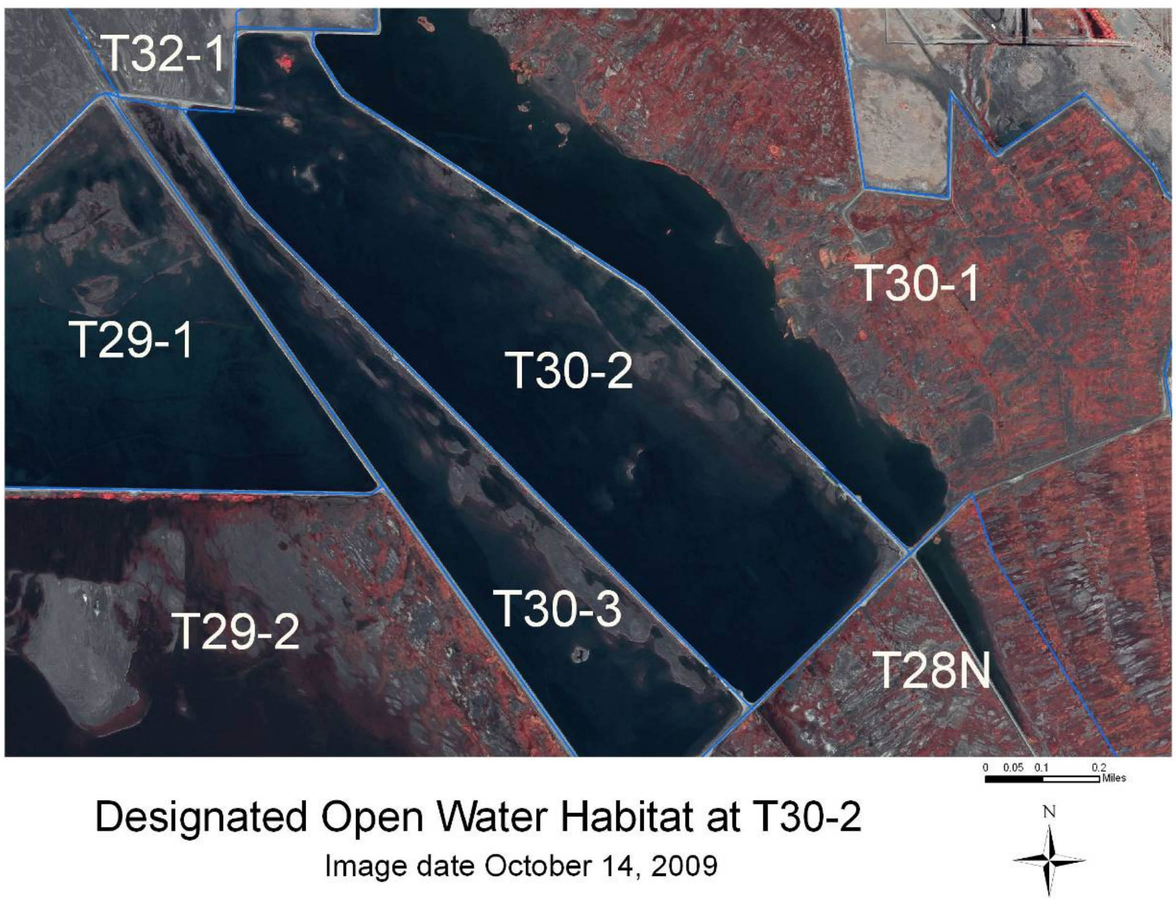


Figure 35. Designated Open Water Habitat at T30-2

6.19. Maintain or Enhance Habitat Values in Moat and Row Cell T1A-1

Moat and row cell T1A-1 is in the south-eastern part of Owens Lake, adjacent to Cartago Springs Wildlife Area and consists of 250 acres. Due to the low level of dust control needed to avoid PM_{10} violations in this area, T1A-1 was designed to minimize impact to Snowy Plover with no moats and the addition of gaps between areas of sand fencing for wildlife movement. In the past, cell T1A-1 supported nesting and foraging snowy plover. It is hoped that this area will still be used by Snowy Plover for nesting and foraging as well as for movement between more productive areas.

There will be approximately 3.8 miles of sand fencing constructed to meet dust control requirements in the 245 acres of T1A-1 that will result in a footprint of 96.1 acres. Gaps in sand fencing will be placed to minimize impacts to vegetation. Additional gaps will provide for movement of wildlife and equipment. Further, two inch vertical gaps will be maintained in the three blocks of sand fence in the eastern portion of the cell to facilitate Snowy Plover brood movement. Monitoring of the sand fence gaps will be implemented based on requirements in the 2009 Moat and Row FSEIR.

To demonstrate continued habitat value, the area will be surveyed during the annual Snowy Plover survey for adults and opportunistically during the nesting season for nesting Snowy Plover. This area will be monitored for continued Snowy Plover use during the annual Snowy Plover survey and will be reported in the Annual report. Further nesting surveys will be performed during the nesting season to document continued Snowy Plover use.

Due to T1A-1's existing habitat value, proximity to Highway 395, and proximity to the Cartago Springs Wildlife Area, LADWP will work towards maintaining the required dust control efficiency with more natural means including vegetation or soil wetness. The preference of CDFG is to remove the sand fences, which may be possible if dust control compliance can be achieved through enhancement of natural features. This strategy would likely result in enhanced habitat compared to pre-project conditions. Control efficiency requirements of less than 99% do not exist for these measures; therefore the details of this possible transition will need to be negotiated in the future.

The 2009 Moat and Row FSEIR determined that there would be no affect to habitat present in T1-A1. However, pursuant to Lake or Streambed Alteration Agreement 1600-2009-0039-R6, LADWP has identified cell T25N to mitigate for impacts associated with the sand fence component of cell TIA-1. Cell T25N will continue to be operated as shallow flood DCA in perpetuity. Alternatively, LADWP may be relieved of this obligation upon the approval of a lake-wide conservation plan.

Prior to the approval of a lake-wide conservation plan, LADWP may apply for an amendment to Lake or Streambed Alteration Agreement 1600-2009-0039-R6 with a request to change the designation of "preserved" cell T25N. This designation may be changed under the following conditions:

- Removal of the sand fence at cell T-1A1; or
- Demonstration of continued habitat value for Snowy Plover comparable to pre-project conditions, based on survey data.

7.0 MONITORING AND ADAPTIVE MANAGEMENT

7.1. Corvid Monitoring

Corvid monitoring will be conducted in connection with the annual lake-wide Snowy Plover population monitoring. The annual monitoring report for corvids will include the discussion of the following:

- abundance, distribution, and observed behavior of corvids;
- raven nest locations;
- observed effectiveness of techniques in minimizing potential corvid impacts;
- results of any corvid management techniques; and
- recommendations for improving corvid management.

If after reporting in 2011, the District determines that the corvid management program is effective and that corvids are not impacting Snowy Plover populations the reporting schedule shall phase out in the same time frame as Ecological Toxicity Monitoring. Reports would be submitted 2012-2015, 2018, and 2023. However, corvid management practices will continue to be implemented throughout the life of the Project.

7.2. Annual Lake-wide Snowy Plover Monitoring

Snowy Plover monitoring is required in 2008 SIP FSEIR (District) which specifies that a long-term Snowy Plover population monitoring program be implemented for the entire Owens Lake bed. Monitoring methodology will be consistent with the methodology used for 2002 Snowy Plover surveys; specifically, they will include a lake-wide Snowy Plover count conducted by surveying all seeps, shallow flood, and other wet areas in late May (peak of breeding season). Surveys are conducted either by traversing areas on foot or surveying from roads. Details of survey methodology can be found in the annual reports. The survey is conducted during a 1- to 2-week period as necessary to cover all areas. The program, as specified in the 2008 SIP EIR, includes the following components:

- Post-construction surveys of plovers in years 1, 2, 3, 4, 5, 7, 9, and 14 after full build out of all construction (year 1 anticipated in 2010).
- Goal to confirm that overall numbers of Snowy Plover in the dust control areas do not decrease due to implementation of dust control from a baseline of 2002 numbers (272 adult birds).
- Annual summary reports for the monitoring efforts are submitted to the District, CDFG, and CSLC.

7.3. Wildlife Morbidity and Mortality Monitoring

Any dead wildlife will have the specific location of the observation recorded with a GPS, other pertinent information to be documented will be an estimate of the age of the carcass, the condition of the carcass, and any notes regarding environmental factors or symptoms noted for other birds in the area. Dead waterbirds will have a field necropsy performed. The field necropsy will record gross abnormalities in tissues and organs. Tissue samples will be taken for laboratory analysis of environmental toxins such as heavy metals.

7.4. Other Lake-wide Waterbird Monitoring

During the annual Snowy Plover lake-wide survey, all other waterbird species will also be recorded. This will provide information regarding trends in breeding population of waterbirds in the Project area. Other waterbird monitoring will be performed opportunistically as time allows during spring and fall migration, and during winter. LADWP will continue to incorporate data provided by lake-wide volunteer survey efforts such as “Big Days” counts. During all monitoring, the numbers of each species of waterbird for each DCM cell will be recorded.

7.5. Ecological Toxicity Monitoring

Monitoring of naturally occurring heavy metals and other potential toxins will be conducted by sampling a subset of DCM cells lake-wide, as required in mitigation measure Biology-6 in the 2008 SIP FSEIR. Media-specific concentrations (water, sediment, algae, invertebrate tissue, and non-viable eggs) of samples obtained in the Project area will be compared to toxicity benchmarks of screening values obtained from previous studies on toxicity to avifauna. This information will be used to evaluate whether bioaccumulation of toxic substances is occurring in the Dust Control Project area, and the potential for exposure to wildlife.

7.6. Noxious Weed Control Monitoring

Field surveys for the presence of noxious weeds in the Project area is ongoing to ensure sufficient control of exotic plant species. Written monitoring reports documenting exotic plant location, type, pretreatment abundance, control type used, and control efficacy are completed annually.

7.7. Habitat Monitoring

Managed vegetation DCM and the designated DAM mitigation area within managed vegetation are monitored in summer and fall to document total cover and vegetative growth according to the *Managed Vegetation Operations and Maintenance Plan* (LADWP 2008a). On the ground monitoring is also performed to assess salt grass rhizome health as well as soil condition.

Moist and saturated alkali meadow, created in T30-1, is monitored annually for floristic diversity and total vegetative in order to assess wetland functions and values according to the *Wetland Mitigation and Monitoring Plan* (LADWP 2006).

Ongoing monitoring of dust control compliance involves analysis of various satellite images for saturated and ponded conditions in all shallow flood DCMs. These data can be used to determine habitat suitability of shorebirds and waterfowl and used to assess vegetation recruitment.

7.8. Reporting

An annual report shall be compiled that summarizes Owens Lake monitoring data, including habitat, vegetation, including noxious weed control, water quality, Snowy Plover, shorebird, and ecological toxicity monitoring, as required. This report will be submitted to CDFG and CSLC.

7.9. Adaptive Management

This management program will annually review monitoring data to assess the status of the habitat evaluated against objectives, and propose management and corrective measures if needed. The adaptive management program recognizes the following activities.

- Acknowledgement of uncertainty regarding which management practices are "best" for ensuring long-term success in maintaining waterbird habitat.
- Ongoing monitoring of key variables to assess objectives.
- Thoughtful selection of the management practices to be applied.
- Analysis of the management outcomes in consideration of the original objectives and incorporation of the results into future decisions.

The adaptive management program, as developed, will include the following components.

- Ongoing annual review of monitoring data and key response indicators to provide early identification of habitat quality problems.
- Evaluation of Snowy Plover and waterbird data considering potential habitat quality issues to assess response.
- Identification of management actions that are ineffective or compromising habitat, and if feasible, redesign of actions or design of new actions to address any issues.

Review of habitat objectives and habitat response to new management measures will be implemented on annually.

7.9.1. Management Revisions

Due to adaptive management any proposed management prescriptions, resource protection measures, monitoring type and frequency, or other requirements, or other terms and conditions direct or implied in this document, may change. LADWP will institute changes to this document to address a number of potential developments, including but not limited to the following:

- Changes in dust control requirements.
- Change in operational and maintenance requirements.
- Evidence that the shallow flood is improving or degrading as habitat.
- Evidence that the lake-wide Snowy Plover population is changing, or use patterns are changing.
- Evidence that shorebird or waterfowl use of various areas is significantly increasing or decreasing.
- Changes to relevant permit requirements.
- Changes to governing environmental documents.
- Changes to recreational uses.
- Increased or decreased need for monitoring information.

Changes in management actions, resource protection measures, or monitoring type and frequency, will be consistent with other regulatory requirements, and documented in the annual report.

If after five years of reporting in 2015, the CDFG determines that the Long-term Habitat Management Plan is effective, then the reporting schedule shall phase out in the same timeframe as Ecological Toxicity and Annual Snowy Plover Monitoring in the table below. However, habitat management practices will be continuously implemented.

Year 1 monitoring event	Year 2 monitoring event	Year 3 monitoring event	Year 4 monitoring event
2010	2011	2012	2013
Year 5 monitoring event	**Year 7 monitoring event**	**Year 9 monitoring event**	**Year 14 monitoring event**
2014	2016	2018	2023

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9.0 RESPONSE TO COMMENTS

This section contains responses to comments on the Draft Owens Lake Habitat Management Plan dated September 2009. This draft document was sent to the CSLC, CDFG and the District for review on September 16, 2009. Comments were received from Marina R. Brand, Assistant Chief, Division of Environmental Planning and Management of CSLC dated November 3, 2009 and from Brad Henderson, Habitat Conservation Supervisor of CDFG dated November 10, 2009. Each comment has been given an identification number. Original comment letters with identification numbers are appended.

9.1. California Department of Fish and Game

CDFG Comment 1:

Page 7 *of the DOLHMP briefly discusses the requirement of LADWP to maintain a minimum of 523 acres of habitat specifically for snowy plovers in perpetuity on Owens Lake and that "this requirement may be in direct conflict with potential future District requirements for development of DCMs on the Owens Lake playa." This statement is confusing, since page 137 discusses the area to be designated consisting of approximately 600 acres owned by LADWP and outside of the Dust Control Area, where no dust control maintenance activities are required. If the LADWP Board were to deny designation of this habitat location in perpetuity, as discussed in the DOLHMP, there is an abundance of shallow flooding acreage for dust control already in place that could be preserved and would not be in direct conflict with Great Basin Unified Air Pollution District (District) requirements.*

LADWP Response: The Snowy Plover Habitat of 523 acres does exist outside of the total dust control area boundary on land owned by the City of Los Angeles. This land is currently not contributing to PM_{10} violations but in the case that it does become emissive the area could potentially require dust control. There is currently no indication that this area will require dust control. Section 1.2.5 and Section 6.17 will reflect this clarification.

CDFG Comment 2:

Pages 26-27 *describes changes in the timing of dust control site water application for the spring and fall shoulder seasons. The Department would like confirmation of approval for these changes from the District.*

LADWP Response: The 2008 SIP discusses changes in the amount of flooding required during the spring and fall shoulder seasons. Additionally, the 2006 Settlement Agreement discusses potential reduction of shallow flood wetness requirements by an average of 10% on areas that require 99% control. The impacts of reducing the amount of water used for dust control, as summarized in the OLHMP, were analyzed for environmental impacts under Water Conservation in the 2008 SIP FSEIR.

CDFG Comment 3:

Page 45 *identifies that brine shrimp (Artemia franciscana) have colonized some ponded DCM cells and can occur in relatively large densities. Please identify when this species was discovered (as adults or having viable cysts), where it was first discovered on Owens Lake, which cells were identified to support large densities of this species and if possible, what salinities are most suitable for their survival. Because brine shrimp were not previously known to be present within the dust control project, vouchers should be collected as soon as possible and species identification should be verified.*

LADWP Response: Brine shrimp (*Artemia franciscana*) have been observed since the summer of 2008. Vouchers of *A. franciscana* were collected in April of 2009 and provided to CDFG in

November 2009. Casual observations have been incorporated in the OLHMP. Further analysis of *A. franciscana* densities and salinity relationships is outside of the scope of the OLHMP.

CDFG Comment 4:

Page 48 *describes the distribution of waterfowl in Figure 7 and Figure 8. Figure 8 is very informative, representing the percent of waterfowl detected by each DCM cell. However Figure 7 depicts moat and row element with sand fence and does not reference waterfowl.*

LADWP Response: Figure references have been corrected.

CDFG Comment 5:

Page 49 *identifies that eared grebes and cormorants are frequently encountered in the project area. The DOLHMP describes that DCM's do not offer suitable food resources for these species. However, eared grebe primarily eats aquatic and land insects, including larvae; and also feeds on crustaceans, mollusks, other invertebrates, small fishes, and amphibians (Palmer 1962, as cited in Zeiner, D.C. et al 1988-1990). This discussion should be expanded to detail why the DCM's are not providing food resources for these species. For informational purposes, please describe the general locations they have been observed on the lake.*

LADWP Response: The OLHMP identifies Eared Grebes as the only grebe species that occurs on Owens Lake with any regularity and discusses their food resources. Other grebe and cormorant species are not common likely due to lack of prey and foraging habitat as discussed in section 4.4.2. While Eared Grebes are a saline adapted species they are relatively uncommon on Owens Lake except for peaks in spring and fall. As suggested an augmented discussion of Eared Grebes has been incorporated in the OLHMP.

CDFG Comment 6

Page 75 *states "There appears to be a stronger nonlinear relationship between salinity and shorebird abundance (Figure 7)." This Figure number is in error and should be changed to Figure 16. The Department would find it very useful and informative to see the incorporation of a table identifying the current salinity ranges or mean salinity for each dust control cell.*

LADWP Response: Salinity of DCM cells can be found in Section 4.2 Table 5. Figure references have been corrected.

CDFG Comment 7

Page 93 *discusses that some shallow flood cells will be managed for the establishment of vegetation, whereas some shallow flood cells are proposed for modification "such that additional islands or berms will be added in order to improve water use efficiency," which, in turn, will increase habitat diversity. It is also discussed that some deep water ponds will be converted to shallow ponds, as these areas are generally more productive than deeper water ponds. The Department would like a clear and detailed process incorporated into the final OLHMP identifying the following: which shallow flood cells are proposed for modification to incorporate islands or berms; which shallow flood cells are proposed to be managed for the establishment of vegetation; which deep water ponded cells are proposed for modification and conversion, including specifics of these modifications as well as the depths of these locations; a timeframe for when these changes are proposed to occur and be fully implemented and; a monitoring plan to observe the response of shorebird and waterfowl species to these changes.*

LADWP Response: A detailed process and timeframe for operation and modification of shallow flood is beyond the scope of this Plan. Furthermore, modification and conversion of shallow flooding to vegetation are currently in the planning process as part of a larger water conservation strategy.

Methods for maintaining shallow flood areas are incorporated into Section 6 of this Plan. Much of the work that is performed in shallow flood is due to unanticipated changes in wetness values in shallow flood areas that need to be corrected immediately in order to maintain dust control efficiency. This operational flexibility in order to perform the work to maintain dust compliance will be imperative with 9.2 additional square miles of shallow flood becoming operational after Phase 7. This additional acreage will tax an already stressed water distribution system. Work that is performed will be in compliance with all mitigation measures discussed in the 2008 SIP FSEIR. Wildlife surveys as well as seven other monitoring components will be included in the annual report as discussed in Section 7 of this Plan.

CDFG Comment 8

Pages 98 and 99 *identify the designation of an appropriate amount of "deep-water" habitat in perpetuity as mitigation for project impacts. The draft OLHMP discusses that there was no deep-water habitat in the project area under baseline surveys, no focal species of waterfowl present during baseline surveys and that no deep-water habitat has been impacted by project construction. It is also discussed that there has been a significant increase of waterfowl species due to project implementation, which accomplishes the goal of deep water habitat. If deep water ponded cells are proposed for modification and conversion, future DCA's may not contain any deep water habitat for waterfowl species. Preservation of adequate amounts of suitable habitats to ensure sustainable wildlife use of Owens Lake is of utmost concern to the Department, and should include all guilds of waterfowl currently using the Lake, irrespective of the wording of the mitigation measure. The Department would like to consult with LADWP, the District, and the California State Lands Commission on how best to interpret this mitigation measure in light of the information provided in the DOLHMP.*

LADWP Response: The data used to determine the appropriate amount of deep water habitat was provided to CDFG in a meeting on September 3 2009 during consultation of habitat designation required in the 2008 SIP FSEIR. As discussed in Section 5.2 no focal species identified in Biology-14 (2008 SIP FSEIR) were present in the project area during baseline surveys and no “deep-water” habitat has been impacted by the Project, only created by it. Therefore the appropriate acreage of “deep-water” area as mitigation for project impacts is zero.

However, providing for continued wildlife use, while controlling dust in a water efficient manner, is a goal of this Plan. Furthermore, as discussed throughout Section 4 of this document “deep-water” in and of itself does not provide for productivity and foraging resources of wildlife. Large “deep-water” areas use water inefficiently and do not necessarily provide foraging habitat for focal species or any other species that occur on Owens Lake. Ponds with open water that are not necessarily “deep” that exists within shallow areas and islands along with appropriate salinity have more waterfowl use than large deep areas alone.

Agreement was reached that T30-2 would provide habitat for continued use by waterbird species that prefer open water. Management of this open water habitat is discussed in Section 6 of this Plan.

Also, discussion of the various guilds of waterfowl that occur on Owens Lake has been incorporated into Section 4.4.1. Most of the waterfowl observed on Owens Lake are dabbling ducks that feed at the water surface and along mudflats. With the low abundance of diving ducks, the needs of these species are not a main management goal of the Plan, given most of these are uncommon species.

CDFG Comment 9

Page 107 *describes measures that will continue to be implemented in the corvid management plan, including the utilization of nixalite or the functional equivalent on ail structures greater than 72 inches high to reduce perching opportunities. The Department requests that this measure be amended to incorporate cell T1A-1, where the proposed moat and row will incorporate sand fence only, and structures will be less than 72 inches.*

LADWP Response: Mitigation Measure 3.1-11 of the 2009 Revised Moat and Row Dust Control Measures FSEIR has been incorporated into Resource Management Actions in Section 6.

CDFG Comment 10

Page 119 *describes spring surveys that will be used to identify shallow flood cells with no snowy plover use to be shut down at the end of the dust control season and that "if a pair of plovers is found in a sheet flow shallow flood cell, then an additional survey may be performed to look for nests and broods within 7 days of planned shut down." The Department requests that this survey be required within 7 days if plovers are found present in a sheet flow cell to be shut down.*

LADWP Response: Request has been incorporated.

9.1.1. Comment Letter From California Department of Fish and Game

State of California - The Resources Agency
DEPARTMENT OF FISH AND GAME
Inland Deserts Region (IDR)
407 West Line Street
Bishop, CA 93514
(760) 872-1171
(760) 872-1284 FAX

Arnold Schwarzenegger, *Governor*

November 10, 2009

Mr. Clarence E. Martin
Assistant Aqueduct Manager
Los Angeles Department of Water and Power
300 Mandich Street
Bishop, CA 93514

Draft Owens Lake Habitat Management Plan

Dear Mr. Martin:

The Department of Fish and Game (Department) has reviewed the Draft Owens Lake Habitat Management Plan (DOLHMP) prepared by the Los Angeles Department of Water and Power (LADWP). The DOLHMP describes the Owens Lake Dust Mitigation Project and components of Measure Bio-14 of the 2008 State Implementation Plan Final Subsequent Environmental Impact Report. This document includes the effects of the dust mitigation project on wildlife resources, habitat management plan goals and objectives, resource management actions, and monitoring and adaptive management to assess the response of habitat and resources to the management objectives and new management measures.

The Department is providing comments on the DSEIR as the State agency which has the statutory and common law responsibilities with regard to fish and wildlife resources and habitats. California's fish and wildlife resources, including their habitats, are held in trust for the people of the State by the Department (Fish and Game Code §711.7). The Department has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and the habitats necessary for biologically sustainable populations of those species (Fish and Game Code §1802). The Department's Fish and wildlife management functions are implemented through its administration and enforcement of Fish and Game Code (Fish and Game Code §702). The Department is a trustee agency for fish and wildlife under the California Environmental Quality Act (see CEQA Guidelines, 14 Cal. Code Regs. §15386(a)). The Department is providing these comments in furtherance of these statutory responsibilities, as well as its common law role as trustee for the public's fish and wildlife.

The Department offers the following comments and recommendations:

Page 7 of the DOLHMP briefly discusses the requirement of LADWP to maintain a minimum of 523 acres of habitat specifically for snowy plovers in perpetuity on Owens Lake and that "this requirement may be in direct conflict with potential future District requirements for development of DCM's on the Owens Lake playa." This statement is confusing, since page 137 discusses the area to be designated consisting of approximately 600 acres owned by LADWP and outside of the Dust Control Area, where no dust control maintenance activities are required. If the LADWP Board were to deny designation of this habitat location in perpetuity, as discussed in the DOLHMP, there is an abundance of shallow flooding acreage for dust control already in place that could be preserved and would not be in direct conflict with Great Basin Unified Air Pollution District (District) requirements. 1

Pages 26-27 describes changes in the timing of dust control site water application for the spring and fall shoulder seasons. The Department would like confirmation of approval for these changes from the District. 2

Page 45 identifies that brine shrimp (*Artemia franciscana*) have colonized some ponded DCM cells and can occur in relatively large densities. Please identify when this species was discovered (as adults or having viable cysts), where it was first discovered on Owens Lake, which cells were identified to support large densities of this species and if possible, what salinities are most suitable for their survival. Because brine shrimp were not previously known to be present within the dust control project, vouchers should be collected as soon as possible and species identification should be verified. 3

Page 48 describes the distribution of waterfowl in Figure 7 and Figure 8. Figure 8 is very informative, representing the percent of waterfowl detected by each DCM cell. However Figure 7 depicts moat and row element with sand fence and does not reference waterfowl. 4

Page 49 identifies that eared grebes and cormorants are frequently encountered in the project area. The DOLHMP describes that DCM's do not offer suitable food resources for these species. However, eared grebe primarily eats aquatic and land insects, including larvae; and also feeds on crustaceans, mollusks, other invertebrates, small fishes, and amphibians (Palmer 1962, as cited in Zeiner, D.C. et al 1988-1990). This discussion should be expanded to detail why the DCM's are not providing food resources for these species. For informational purposes, please describe the general locations they have been observed on the lake. 5

Page 75 states "There appears to be a stronger nonlinear relationship between salinity and shorebird abundance (Figure 7)." This Figure number is in error and should be changed to Figure 16. The Department would find it very useful and informative to see the incorporation of a table identifying the current salinity ranges or mean salinity for each dust control cell. 6

Page 93 discusses that some shallow flood cells will be managed for the establishment of vegetation, whereas some shallow flood cells are proposed for modification "such that additional islands or berms will be added in order to improve water use efficiency," which, in turn, will increase habitat diversity. It is also discussed that some deep water ponds will be converted to shallow ponds, as these areas are generally more productive than deeper water ponds. The Department would like a clear and detailed process incorporated into the final OLHMP identifying the following: which shallow flood cells are proposed for modification to incorporate islands or berms; which shallow flood cells are proposed to be managed for the establishment of vegetation; which deep water ponded cells are proposed for modification and conversion, including specifics of these modifications as well as the depths of these locations; a timeframe for when these changes are proposed to occur and be fully implemented and; a monitoring plan to observe the response of shorebird and waterfowl species to these changes. 7

Pages 98 and 99 identify the designation of an appropriate amount of "deep-water" habitat in perpetuity as mitigation for project impacts. The draft OLHMP discusses that there was no deep-water habitat in the project area under baseline surveys, no focal species of waterfowl present during baseline surveys and that no deep-water habitat has been impacted by project construction. It is also discussed that there has been a significant increase of waterfowl species due to project implementation, which accomplishes the goal of deep water habitat. If deep water ponded cells are proposed for modification and conversion, future DCA's may not contain any deep water habitat for waterfowl species. Preservation of adequate amounts of 8

Mr. Martin
November 10, 2009
Page 3

suitable habitats to ensure sustainable wildlife use of Owens Lake is of utmost concern to the Department, and should include all guilds of waterfowl currently using the Lake, irrespective of 8 cont.
the wording of the mitigation measure. The Department would like to consult with LADWP, the District, and the California State Lands Commission on how best to interpret this mitigation measure in light of the information provided in the DOLHMP.

Page 107 describes measures that will continue to be implemented in the corvid management plan, including the utilization of nixalite or the functional equivalent on all structures greater than 72 inches high to reduce perching opportunities. The Department 9
requests that this measure be amended to incorporate cell T1A-1, where the proposed moat and row will incorporate sand fence only, and structures will be less than 72 inches.

Page 119 describes spring surveys that will be used to identify shallow flood cells with no snowy plover use to be shut down at the end of the dust control season and that "if a pair of plovers is found in a sheet flow shallow flood cell, then an additional survey *may be* performed 10
to look for nests and broods within 7 days of planned shut down." The Department requests that this survey be required within 7 days if plovers are found present in a sheet flow cell to be shut down.

The Department commends LADWP's efforts in preparing the DOLHMP and appreciates the opportunity to comment well before the document is due. Congratulations are in order for the very good quality of this document. Questions regarding this letter and further coordination on these issues should be directed to Brad Henderson at (760) 873-4412 or Tammy Branston at (760) 872-0751.

Sincerely,

Brad Henderson
Habitat Conservation Supervisor

cc: Department of Fish and Game
State Clearinghouse
State Lands Commission
GBUAPCD

9.2. California State Lands Commission

CSLC Comment 1

Page 1 - 4th paragraph, last sentence: add "if approved".

LADWP Response: Comment noted

CSLC Comment 2

Page 3 - 1st bullet:"... in order to support focal migratory..."; is "focal" a typo and should be changed to "local"?

LADWP Response: Focal migratory species were defined within the 2008 SIP FSEIR.

CSLC Comment 3

Page 4 - 1st paragraph, 2nd and 3rd sentence: The altitude is the same (3,597 feet), but the text describes a comparison of two different elevations. Please address.

LADWP Response: The text describes changes in the lake elevation from the historical lake elevation.

CSLC Comment 4

Page 4 - last paragraph, 1st sentence: "DCAs exist around the north, west, and south edges ..."; should "west" be "east" of the brine pool?

LADWP Response: DCA locations have been corrected.

CSLC Comment 5

Page 10 - 1st paragraph: Tyler et al. 1997 is not in the references. On a general note, there are several other references cited in the document that are not in the references section, e.g., Stradling 1997 and Ayars 1997 (page 35), Page 2003 (page 53), CH2MHILL 2005 (page 104), Kadlec and Smith 1989 (page 111), USFWS 1998 (page 113), Eldridge 1995 (page 117), etc.

LADWP Response: Citations in the reference section have been corrected. Data sources are cited in Section 4.13.

CSLC Comment 6

Page 44 - Section 4.0 Effects of the Dust Control Project on Wildlife Resources: This section does not provide the possible effects that can be anticipated from the moat and row dust control measure as described in Section 3.12 of the OLHMP.

LADWP Response: Section 4 describes the effects of current dust control measure on wildlife. Since no moat and row DCM's are in operation at the time of writing of this Plan there have been no effects observed. The 2009 FSEIR for the Revised Moat and Row Dust Control Measure has been incorporated into Section 6, which describes resource management measures to be implemented.

CSLC Comment 7

Page 106 - Section 6.5.1: Is West Nile Disease an issue with waterbirds in addition to the other diseases?

LADWP Response: Discussion of West Nile virus has been incorporated into potential diseases and monitoring will continue to be performed under the Vector Control Program as required in the 2008 SIP FSEIR.

CSLC Comment 8

Page 112 - Section 6.9: Can the final Noxious Weed Monitoring and Control Program be attached to the OLHMP as an appendix?

LADWP Response: Annual reports of noxious weed management summarize requirements of the Noxious Weed Monitoring and Control Program. A copy of this plan will be submitted to CSLC with the final OLHMP.

CSLC Comment 9

Page 141 - Section 7.6: will the monitoring reports for Noxious Weed Control Monitoring be included in the reporting under Section 7.8 or will there be separate monitoring reports submitted for just the noxious weeds control?

LADWP Response: All biological monitoring performed as required by the 2008 SIP FSEIR and associated permits will be incorporated into one annual report.

CSLC Comment 10

References Section: references are incomplete. As pointed out above, many of the references cited in the OLHMP are not provided in this section.

LADWP Response: The references (Section 8) have been updated.

9.2.1. Comment Letter From California State Lands Commission

STATE OF CALIFORNIA — ARNOLD SCHWARZENEGGER, *Governor*

CALIFORNIA STATE LANDS COMMISSION
100 Howe Avenue, Suite 100-South
Sacramento, CA 95825-8202

PAUL D. THAYER, *Executive Officer*
(916) 574-1800 FAX (916) 574-1810
Relay Service From TDD Phone **1-800-735-2929**
from Voice Phone **1-800-735-2922**

Contact Phone: **(916) 574-1900**
Contact FAX: **(916) 574-1885**

C. E. MARTIN
NOV 06 2009

November 3, 2009

File Ref: Owens Lake

Clarence Martin
Los Angeles Dept. of Water and Power
300 Mandich Street
Bishop, CA 93514

Subject: Owens Lake Habitat Management Plan for the Owens Lake Dust Mitigation Project, Inyo County

Dear Mr. Martin:

Staff of the California State Lands Commission (CSLC) has reviewed the Owens Lake Habitat Management Plan (OLHMP) prepared by Los Angeles Department of Water and Power (LADWP). This document was prepared to fulfill Mitigation Measure Bio-14 of the 2008 State Implementation Plan Final Subsequent Environmental Impact Report. The following provides comments on the OLHMP.

Page 1 - 4th paragraph, last sentence: add "if approved". 1

Page 3 - 1st bullet: "... in order to support focal migratory..."; is "focal" a typo and should be changed to "local"? 2

Page 4 - 1st paragraph, 2nd and 3rd sentence: The altitude is the same (3,597 feet), but the text describes a comparison of two different elevations. Please address. 3

Page 4 - last paragraph, 1st sentence: "DCAs exist around the north, west, and south edges . . ."; should "west" be "east" of the brine pool? 4

Page 10 - 1st paragraph: Tyler et al. 1997 is not in the references. On a general note, there are several other references cited in the document that are not in the references section, e.g., Stradling 1997 and Ayars 1997 (page 35), Page 2003 (page 53), CH2MHILL 2005 (page 104), Kadlec and Smith 1989 (page 111), USFWS 1998 (page 113), Eldridge 1995 (page 117), etc. 5

Page 44 - Section 4.0 Effects of the Dust Control Project on Wildlife Resources: This section does not provide the possible effects that can be anticipated from the moat and row dust control measure as described in Section 3.12 of the OLHMP. 6

Clarence Martin Page 2 November 3, 2009

Page 106 - Section 6.5.1: Is West Nile Disease an issue with waterbirds in addition to the other diseases? 7

Page 112 - Section 6.9: Can the final Noxious Weed Monitoring and Control Program be attached to the OLHMP as an appendix? 8

Page 141 - Section 7.6: will the monitoring reports for Noxious Weed Control Monitoring be included in the reporting under Section 7.8 or will there be separate monitoring reports submitted for just the noxious weeds control? 9

References Section: references are incomplete. As pointed out above, many of the references cited in the OLHMP are not provided in this section. 10

If you have any questions concerning CSLC staff review, please contact Eric Gillies at (916) 574-1897 or by e-mail at gilliee@slc.ca.gov.

Sincerely,

Marina R. Brand

Marina R. Brand, Assistant Chief
Division of Environmental Planning
and Management

cc: J. Brown, CSLC
E. Gillies, CSLC
S. Mindt, CSLC

9.3. Final California Department of Fish and Game Comments and Response

Hello Tammy,

Responses below in red

-Jeff
-----Original Message-----
From: Tammy Branston [mailto:TBranston@dfg.ca.gov]
Sent: Monday, March 22, 2010 4:53 PM
To: Nordin, Jeffrey
Cc: Brad Henderson
Subject: OLHMP Comments

Hi Jeff,

Thank you for the OLHMP copies and for your response to our comments. There are still two of the Department's comments that require further explanation before we can write an approval letter for the plan.

CDFG Comment 3:

Page 45 identifies that brine shrimp (Artemia franciscana) have colonized some ponded DCM cells and can occur in relatively large densities. Please identify when this species was discovered (as adults or having viable cysts), where it was first discovered on Owens Lake, which cells were identified to support large densities of this species and if possible, what salinities are most suitable for their survival. Because brine shrimp were not previously known to be present within the dust control project, vouchers should be collected as soon as possible and species identification should be verified.

Your response identified that this species was observed since the summer of 2008-thank you. Where was this discovery made (i.e. what cell specifically on the lake)?

The find was first reported by GANDA during eco-toxicity sampling in 2008. Their report did not contain the cell location.

The OLHMP identified "that brine shrimp (Artemia franciscana) have colonized some ponded DCM cells and can occur in relatively large densities." We asked which cells were identified to support large densities (since large densities can occur, as the plan identified above) and your response was that an analysis of densities is outside the scope of the plan. The Department did not ask for an analysis of densities. We only want to know where they have been found on the lake and are interested in learning any knowledge you have acquired and are able to share with us about this species. If you do not have data on which salinities are suitable for their survival, then obviously you cannot share it with us. You did, however, state that there are at least eight areas where this species has been observed, including Phase 4 and 5 shallow flood as well as phase 1 sheet flow shallow flood areas. Again, which areas (cells specifically), were large densities (or any densities at all) of brine shrimp observed on the lake? Again, we are looking for information you already have acquired, as the presence of this species is of great value to Owens Lake.

The eight cells are T11, T13-3, T18S, T18N, T26, T28, T36-2, and T29-2 where *Artemia* were observed.

I will insert a sentence with those cells. Densities were just observed, not measured, and the salinity of the cells at the time of observation are unknown.

We had suggested in our comments that "vouchers should be collected as soon as possible and species identification should be verified," as a result of meeting with Dr. David Herbst. Dr. Herbst viewed your collected voucher under a microscope and stated that it is positively an Artemia species but that it could not possibly be identified to species Artemia franciscana without further genetic analysis and that it would be inappropriate to call it any thing other than Artemia sp. until positively identified.

The identification was made by GANDA. I will change any reference to Brine Shrimp found at Owens Lake as *Artemia* sp.

CDFG Comment 7:

Page 93 discusses that some shallow flood cells will be managed for the establishment of vegetation, whereas some shallow flood cells are proposed for modification "such that additional islands or berms will be added in order to improve water use efficiency," which, in turn, will increase habitat diversity. It is also discussed that some deep water ponds will be converted to shallow ponds, as these areas are generally more productive than deeper water ponds. The Department would like a clear and detailed process incorporated into the final OLHMP identifying the following: which shallow flood cells are proposed for modification to incorporate islands or berms; which shallow flood cells are proposed to be managed for the establishment of vegetation; which deep water ponded cells are proposed for modification and conversion, including specifics of these modifications as well as the depths of these locations; a timeframe for when these changes are proposed to occur and be fully implemented and; a monitoring plan to observe the response of shorebird and waterfowl species to these changes.

Your response was that a detailed process and timeframe for operation and modification of shallow flood is beyond the scope of the plan and that these modifications and conversions are part of a larger water conservation strategy.

If the modification and conversion of shallow flood is beyond the scope of the plan, then the entire paragraph identifying modification and conversion of DCM cells must be eliminated and addressed only in the larger water conservation strategy. If you propose to keep this language in the plan, you need to clarify that the "larger water conservation strategy," master plan will clearly address the Department's comments above and that no modification or conversion of any shallow flood cell will occur in this plan (beyond the natural colonization and establishment of vegetative growth identified in the first paragraph of section 5.2 part 8).

I will delete that paragraph.

These are the Department's remaining comments regarding the OLHMP. Once addressed, we will provide you with a supportive letter of approval for the plan. If you have any questions, please feel free to contact me.

Thank you,
Tammy

Tammy Branston
Environmental Scientist
Department of Fish and Game
Habitat Conservation Program
(760) 872-0751
407 West Line St.
Bishop, CA 93514