Lower Owens River Project

2009
Annual Monitoring Final Report

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Inyo County Water Department,
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1.0 Lower Owens River Project Monitoring Report Introduction

The Lower Owens River Project (LORP) is a large-scale habitat restoration project in Inyo County, California being implemented through a joint effort by the Los Angeles Department of Water and Power (LADWP) and Inyo County (County). The LORP was identified in a *1991 Environmental Impact Report* (EIR) as mitigation for impacts related to groundwater pumping by LADWP from 1970 to 1990. The description of the project was augmented in a *1997 Memorandum of Understanding* (MOU), signed by LADWP, County, California Department of Fish and Game (CDFG), California State Lands Commission (SLC), Sierra Club, and the Owens Valley Committee. The MOU specifies the goal of the LORP, timeframe for development and implementation, and specific actions. It also provides certain minimum requirements for the LORP related to flows, locations of facilities, and habitat and species to be addressed.

The overall goal of the LORP, as stated in the MOU, is as follows:

> "The goal of the LORP is the establishment of a healthy, functioning Lower Owens River Riverine-Riparian ecosystem, and the establishment of healthy, functioning ecosystems in the other physical features of the LORP, for the benefit of biodiversity and Threatened and Endangered Species, while providing for the continuation of sustainable uses including recreation, livestock grazing, agriculture and other activities."

LORP implementation included release of water from the Los Angeles Aqueduct (LAA) to the Lower Owens River, flooding of approximately 500 acres in the Blackrock Waterfowl Management Area (BWMA), maintenance of several Off-River Lakes and Ponds, modifications to land management practices, and construction of new facilities including a pump station to capture a portion of the water released to the river.

The LORP was evaluated under CEQA resulting in the completion of an EIR in 2004.

1.1. Monitoring and Reporting Responsibility

Section 2.10.4 of the Final LORP EIR states that the County and LADWP will prepare an annual report that includes data, analysis, and recommendations. Monitoring of the LORP will be conducted annually by the Inyo County Water Department (ICWD), LADWP and the MOU consultant, Ecosystem Sciences (ES) according to the methods and schedules described under each monitoring method as described in Section 4 of the *Lower Owens River Monitoring Adaptive Management and Reporting Plan* (Ecosystem Sciences, 2008).

Specific reporting procedures are also described under each monitoring method. The MOU requires that the County and LADWP provide annual reports describing the environmental conditions of the LORP. LADWP and the County are to prepare an annual report and include the summarized monitoring data collected, the results of analysis, and recommendations regarding the need to modify project actions as recommended by the MOU consultant, ES. This LORP Annual Monitoring Report describes monitoring data, analysis, and recommendations for the LORP based on data collected during 2009. The development of the LORP Annual Monitoring Report is a collaborative effort between the ICWD, LADWP and the MOU Consultant. Personnel from these entities participated in different sections of the report writing, data collection and analysis.

The 2007 Stipulation & Order also requires the release to the public and representatives of the Parties identified in the MOU a draft of the annual report. The 2007 Stipulation & Order states in Section L:

> "LADWP and the County will release to the public and to the representatives of the Parties identified in the MOU a draft of the annual report described in Section 2.10.4 of the Final LORP EIR. The County and LADWP shall conduct a public meeting on the information contained in the draft report. The draft report will be released at least 15 calendar days in advance of the meeting. The public and the Parties will have the opportunity to offer comments on the draft report at the meeting and to submit written comments within a 15 calendar day period following the meeting. Following consideration of the comments submitted the Technical Group will conduct the meeting described in Section 2.10.4 of the Final LORP EIR."

Generally, LADWP is the lead author for a majority of the document and is responsible for overall layout, and content management. Specifically, LADWP wrote: Sections 1.0 Introduction; 2.0 Seasonal Habitat Flow; 3.0 Assessment of River Flow Gains and Losses, 4.0 Rapid Assessment Report; 5.0 Hydrologic Monitoring; and 6.0 Land Management. Section 7.0, Weed Control was jointly authored by ICWD, Inyo County Agricultural Commission, and LADWP. Section 8.0 Delta Habitat Area Assessment was jointly authored by LADWP and ES. ES is the lead author for Section 9.0, Adaptive Management Recommendations. ICWD was the lead author for the water quality portion of the Seasonal Habitat Flow Section.

As described in the *Lower Owens River Monitoring Adaptive Management and Reporting Plan* (Ecosystem Sciences, 2008) copies of the annual monitoring report will be distributed to the other MOU parties (CDFG, SLC, Sierra Club, and the Owens Valley Committee) and made available to the public.

This document represents the reporting requirements for the LORP Annual Monitoring Report for 2009.

1.2. 2009 Monitoring

2009 was the second year of monitoring for the LORP. The monitoring that was conducted included:

- Seasonal Habitat Flow Flooded Extent and Water Quality (May and June 2009)
- Assessment of River Flow Gains and Losses (September 2009)
- Rapid Assessment Survey (August 2009)
- Hydrologic Monitoring (throughout 2009)
- Land Management (throughout 2009)
- Weed Monitoring and Treatment (growing Season 2009)
- Delta Habitat Assessment

2.0 Seasonal Habitat Flow Report

2.1. Purpose of the Seasonal Habitat Flow

The goal of the LORP, as stated in the MOU:

> "The goal of the LORP is the establishment of a healthy functioning Lower Owens River Riverine-Riparian ecosystem, and the establishment of healthy, functioning ecosystems in the other physical features of the LORP, for the benefit of biodiversity and Threatened and Endangered Species, while providing for the continuation of sustainable uses including recreation, livestock grazing, agriculture and other activities".

The MOU requires that flow and land management be used in conjunction to "create and maintain, to the extent feasible, diverse natural habitats consistent with the needs of the 'habitat indicator species' ".

The purpose of the seasonal habitat flow, as described in the MOU, is to create a dynamic equilibrium for riparian habitat, the fishery, water storage, water quality, animal migration, and biodiversity, which results in resilient productive ecological systems. The MOU outlines flow regimes for seasonal habitat flows. For average to above average runoff years, the flow regime includes releasing 200 cubic feet per second (cfs) into the Lower Owens River. For below average runoff years, the flow regime includes a reduction from 200 cfs to as low as 40 cfs in general proportion to the forecasted runoff in the watershed (MOU 1997, Section II, page 12).

Seasonal habitat flows are "to be of sufficient frequency, duration and amount and will be implemented in order to (1) minimize the quantity of muck and other river bottom material that is transported out of the Riverine-Riparian system, but will cause this material to be redistributed on floodplains and terraces within the Riverine-Riparian system and the Owens River Delta for the benefit of the vegetation; (2) fulfill the wetting, seeding and germination needs of riparian vegetation, particularly willow and cottonwood; (3) recharge the groundwater in the streambanks and the floodplain for the benefit of wetlands and the biotic community; (4) control tules and cattails to the extent possible; (5) enhance the fishery; (6) maintain water quality standards and actions; and (7) enhance the river channel (Hill and Platts 1995)."

The MOU specifies that the amount of seasonal annual habitat flow be set by the Standing Committee, "subject to any applicable court orders concerning the discharge of water onto the bed of the Owens Lake and in consultation with California Department of Fish and Game (CDFG) and to be based on the Lower Owens Riverine-Riparian Ecosystem element of the LORP Plan, which will recommend the amount, duration and timing of flows necessary to achieve the goals for the system under varying hydrologic scenarios (MOU 1997, Section II, page 12)."

2.2. 2009 Seasonal Habitat Flow Objectives

In addition to addressing the goals and obligations of the MOU and water quality permits, the primary objectives for the 2009 seasonal habitat flow includes:

- Release and convey a seasonal habitat flow from the LAA Intake to the Owens River Delta during springtime willow and cottonwood seed development
- Estimate flooded extent

- Compare inundated landforms to assist in predicting riparian/wetland vegetation areas
- Measure water quality parameters
- Continue to test effectiveness of river flow measuring stations
- Improve knowledge of travel time and channel losses or gains

2.3. Seasonal Habitat Flow Timing

Beginning May 1, 2009, LADWP Watershed Resources staff began weekly evaluations of catkins on willow and cottonwood trees within the LOPR area. Beginning May 14 daily observations were made on catkin maturation. On May 18 some catkins had begun to release seed. On May 21, staff walked 1-mile upstream of the river intake as well as the river between Mazourka Canyon and Manzanar Reward Roads. At this time approximately 15% of the catkins were ripe and releasing seed. Average daily temperatures at Big Pine and Independence were 94 and 95 degrees respectively during that week with the long range forecast predicting a continuation of temperatures in the mid-90's for the next two weeks. Flow releases began ramping at the Intake on May 24 reaching 110 cfs on May 27 with the pulse taking nearly 13 days to travel throughout the river, passing the Pump Station on June 9. During this period, average daily temperatures dropped an average of 13 degrees throughout the LORP area (Seasonal Habitat Flow Table 1). This large and unexpected decrease in daily temperature retarded the maturation of the willow and cottonwood catkins to the point that the seasonal habitat flow did not occur during the peak of seed production.

Seasonal Habitat Flow Table 1. Temperature (ºF) During Flow Time Period

TIME PERIOD	Big Pine	Independence	Lone Pine
May 10 - 16	92	92	90
May 17 - 23	94	95	90
May 24 - 30	87	91	88
May 31 - June 6	80	82	81
June 7 - 13	81	81	78

2.4. Seasonal Habitat Flows

Flows in the Lower Owens River and its tributaries, including return ditches, are monitored by LADWP's automatic and manual metering equipment. Flows are reported by the LADWP website 2-3 days after the date. Flow data are presented in Appendix 2D. Water releases were increased 2-29 cfs per day beginning on May 24. The entire flow event lasted approximately 24 days at any given point on the river. The maximum flow released from the LAA Intake, 110 cfs, was reached on May 27. The leading edge of the increased flows reached the Keeler weir on June 8. Maximum flows, other than those recorded at the LAA Intake, recorded in the Owens River during the 2009 seasonal habitat flow were recorded May 29 and May 30 at 104 and 106 cfs at the East of Goose and Two Culverts measuring stations respectively. The maximum flow recorded above the Pumpback Station was 74 cfs on June 9, 2009. Flows returned to normal base flow conditions at all stations by June 16, 2009.

2.5. Hydrologic Infrastructure

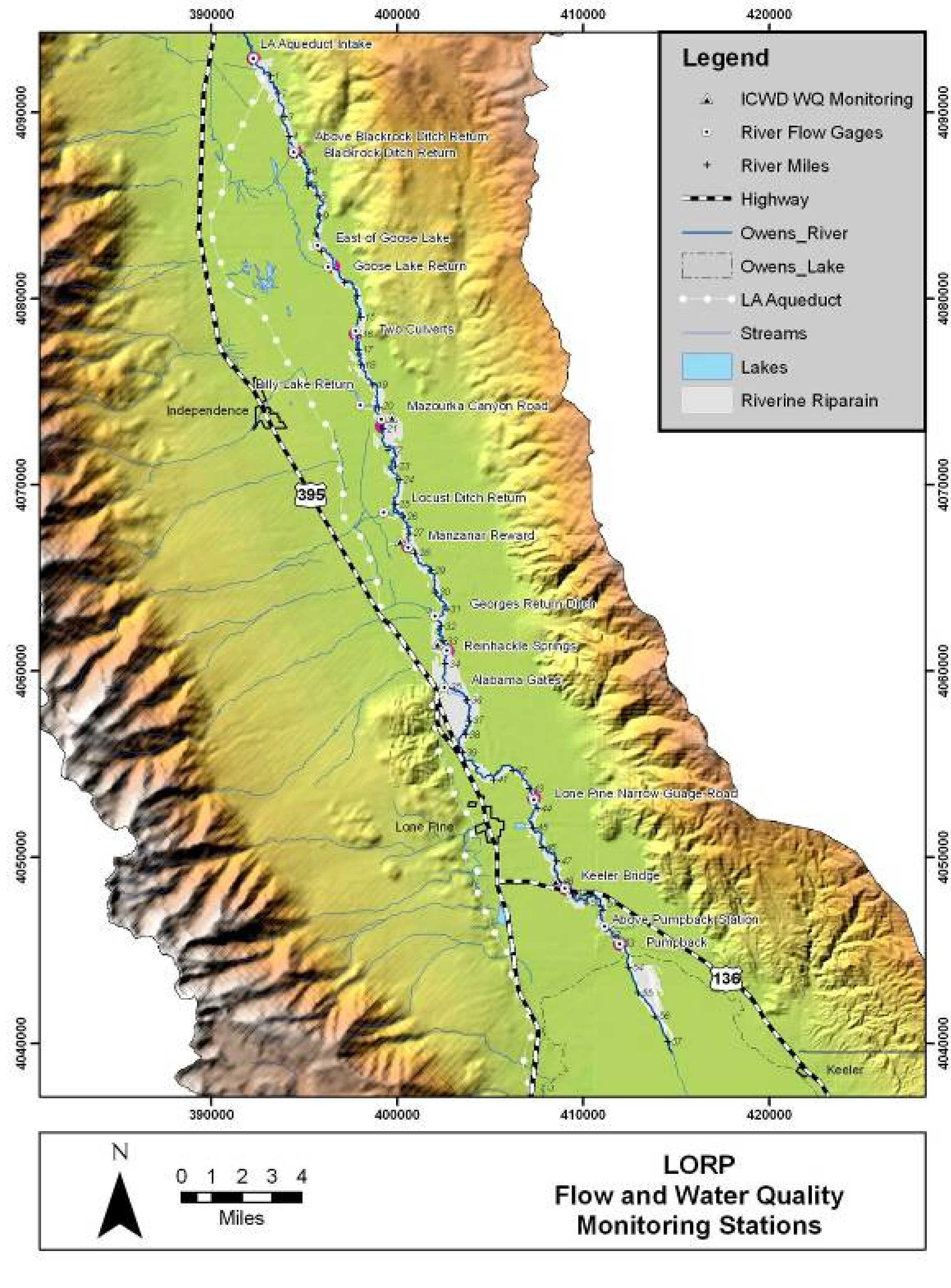
Automated flow monitoring in the Lower Owens River occurred at ten locations from the gated release at the LAA Intake to the Pumpback Station upstream of the Delta. Flow is also monitored in six spillgate ditch tributaries. Seasonal Habitat Flow Table 2 lists the flow monitoring stations.

Seasonal Habitat Flow Figure 1 displays the locations of the flow monitoring stations. Additional detailed information, including descriptions of baseflow monitoring and flow measuring stations can be found in Section 4.3.1 of the *LORP Monitoring, Reporting, and Adaptive Management Plan* (Ecosystems Sciences 2008).

Seasonal Habitat Flow Table 2. Measuring Stations with Altitude Values

STATION NAME	ALTITUDE (m)
***LAA Intake**	**1164**
Above Blackrock Ditch Return	1159
***Blackrock Ditch Return**	**1159**
***East of Goose Lake**	**1153**
Goose Lake Return	1154
***Two Culverts**	**1147**
Billy Lake Return	1144
***Mazourka Canyon Road**	**1140**
Locust Ditch Return	1143
***Manzanar Reward Road**	**1128**
Georges Return Ditch	1124
***Reinhackle Springs**	**1119**
Alabama Gates	1117
***Lone Pine Narrow Gage Road**	**1106**
***Keeler Weir**	**1099**
***Above Pumpback Station**	**NA**
***Pumpback Station**	**1098**

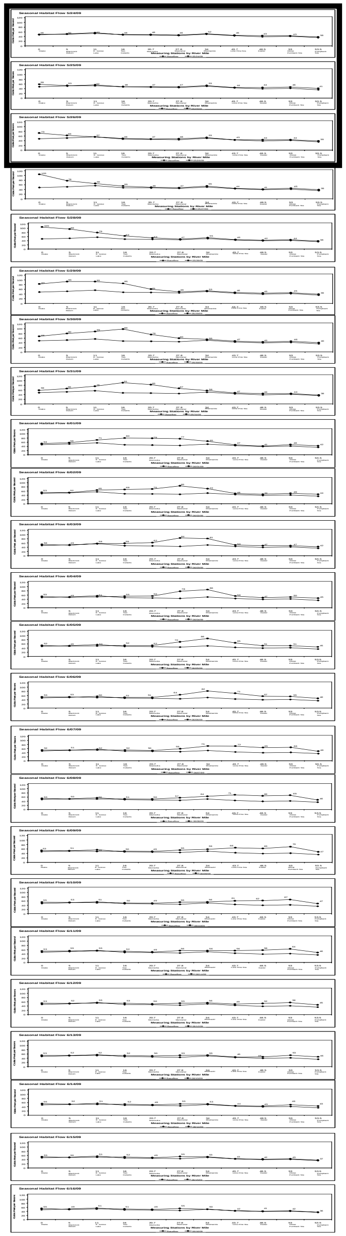
* *In-river stations*

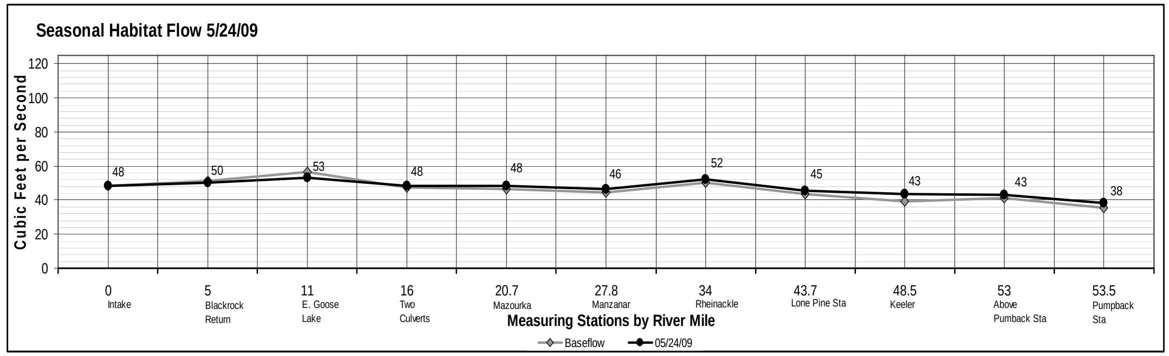


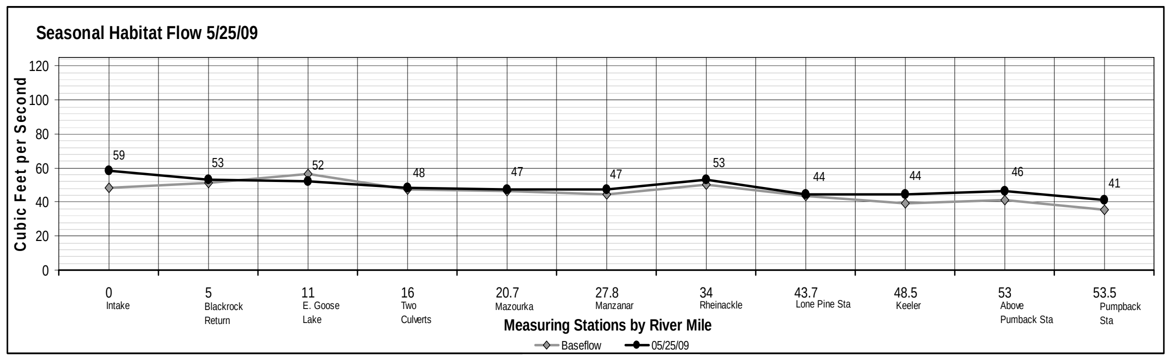
Seasonal Habitat Flow Figure 1. Flow Gaging and Water Quality Monitoring Stations

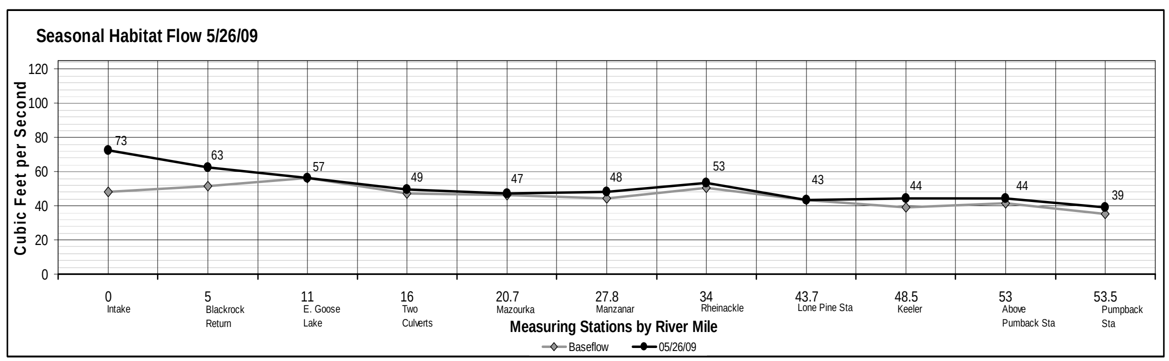
The following illustrations, Seasonal Habitat Flow Figure 2, display the river flow (daily averages not peak measurements) by measuring station and river mile for each day that the flow release occurred. Values reported at the Pumpback Station represent the amount of flow being pumped back to the LAA. The difference between the Above Pumpback Station and Pumpback Station is the amount of water released to the Owens Lake Delta. The illustrations display 24 days of river flow data from May 24 through June 16, 2009 (baseflow to high-flow and return to baseflow). The flow illustrations show baseflow as a light grey line with light grey diamond markers and the seasonal habitat flow as a black line with black circle markers. River flow data for these illustrations is based on the summarized data in Appendix 2D.

Days 1-3 of 24



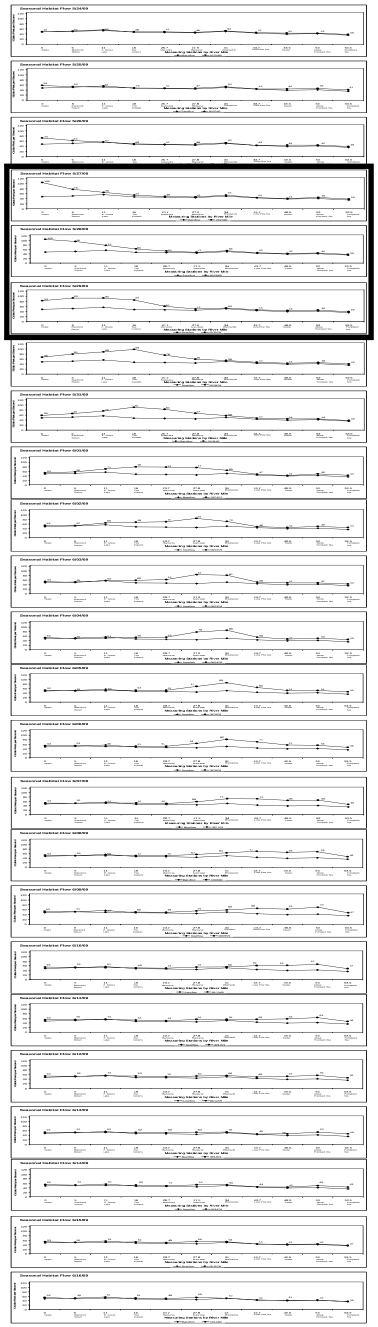


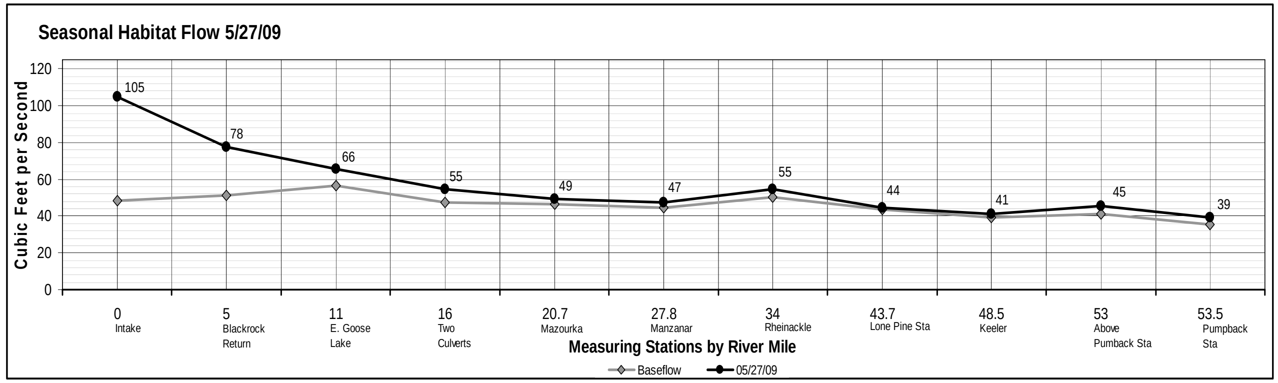


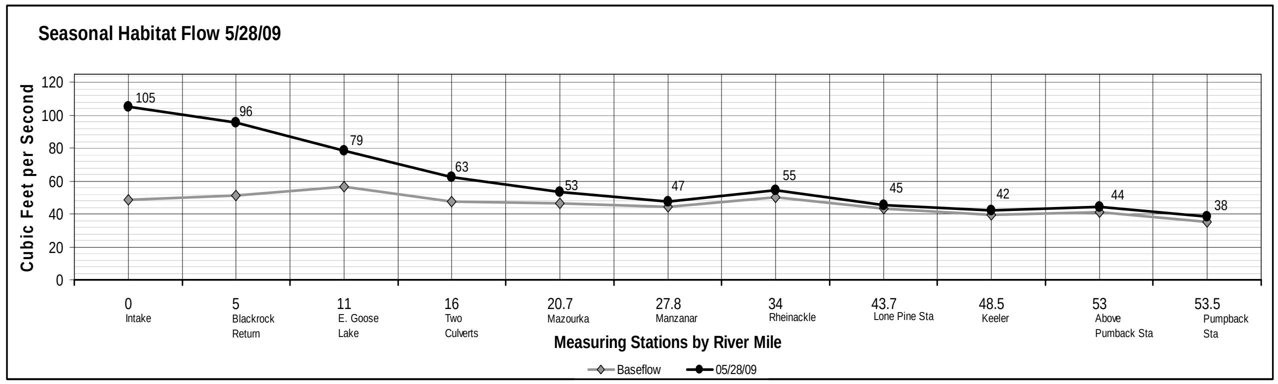


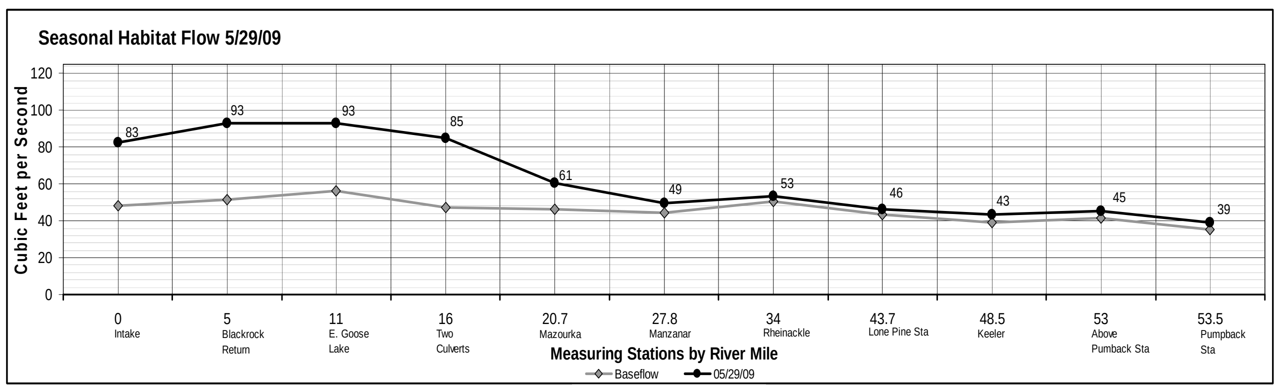
Seasonal Habitat Flow Figure 2. River Flow Days 1-3

Days 4-6 of 24



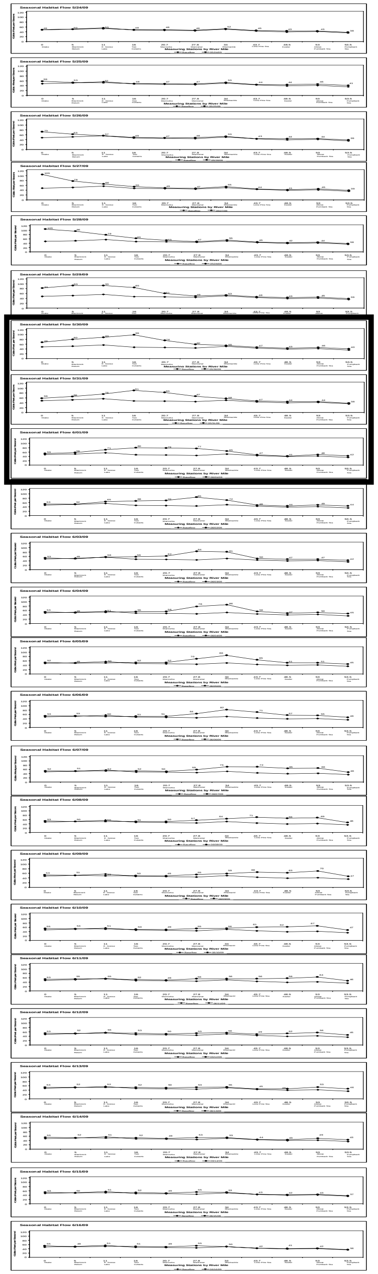


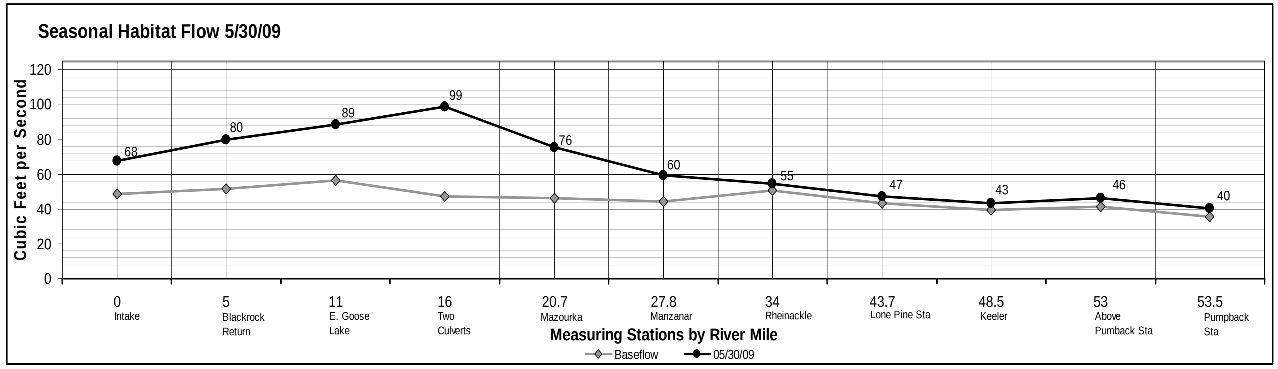


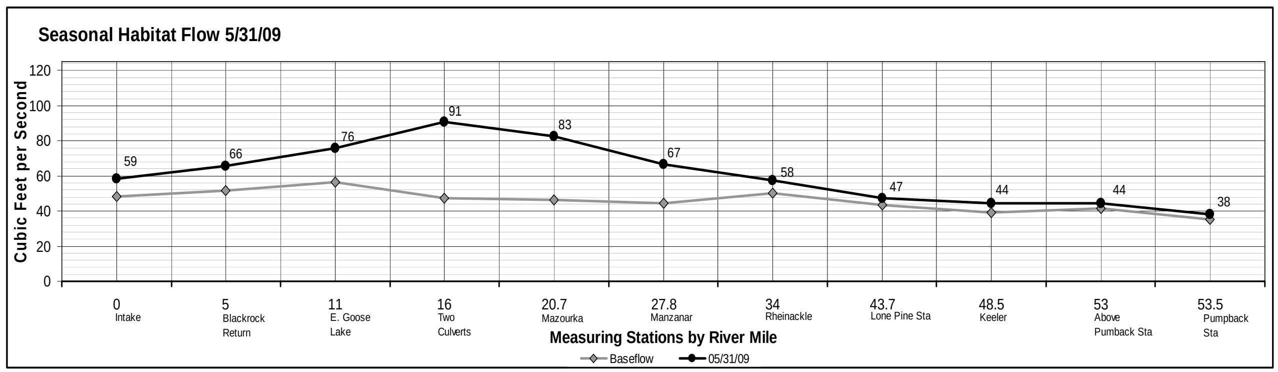


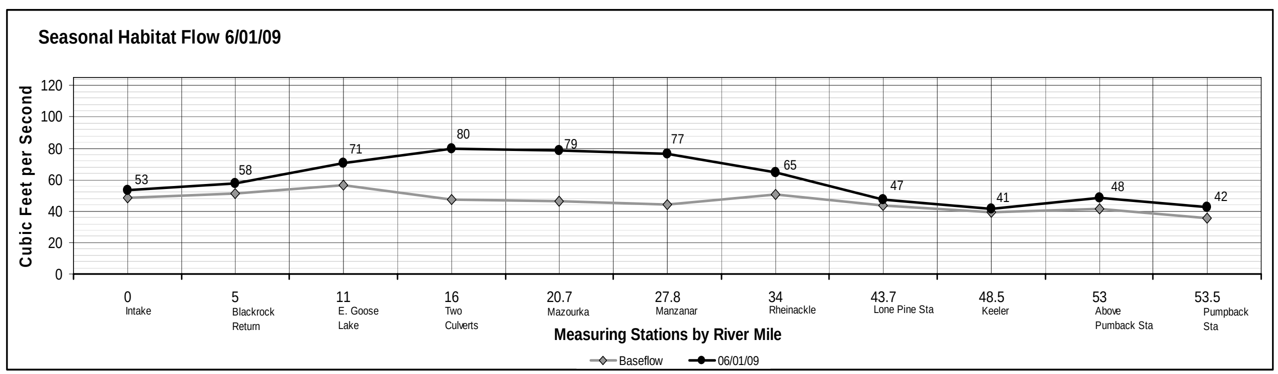
Seasonal Habitat Flow Figure 2, continued. River Flow Days 4-6

Days 7-9 of 24



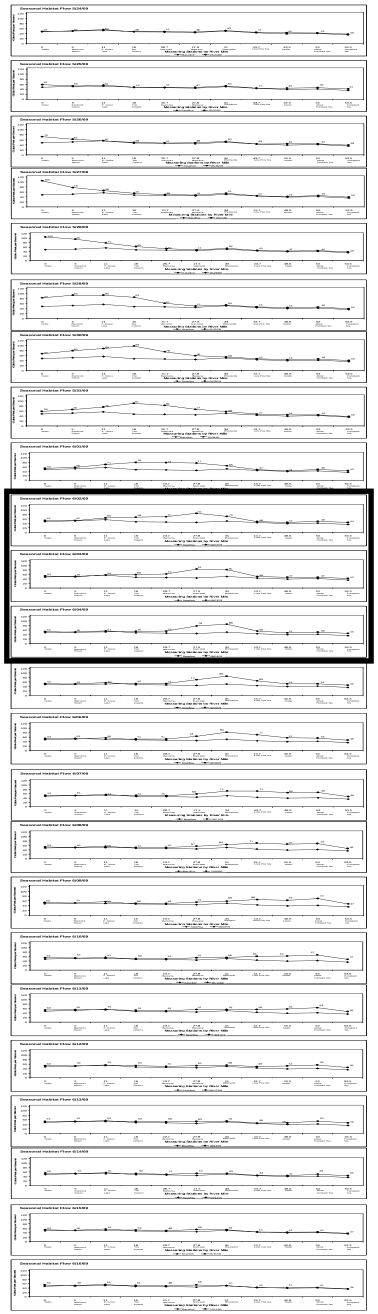


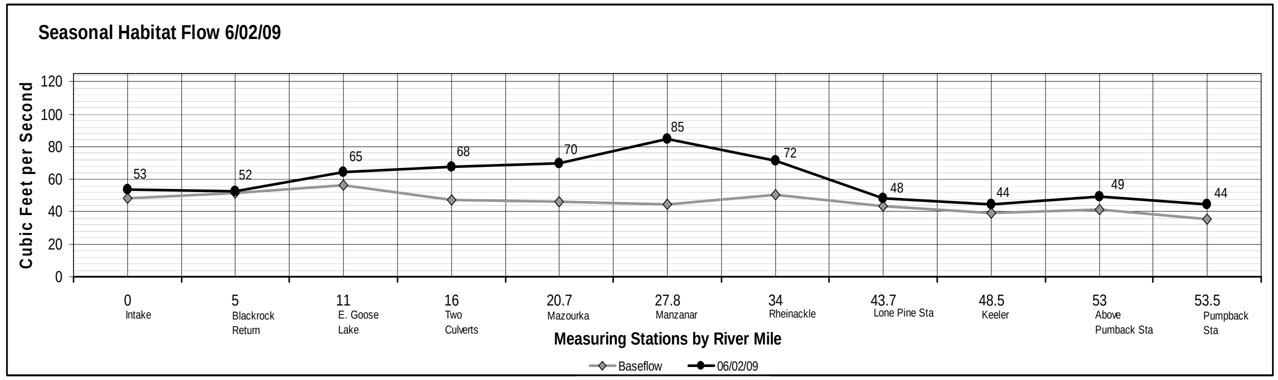


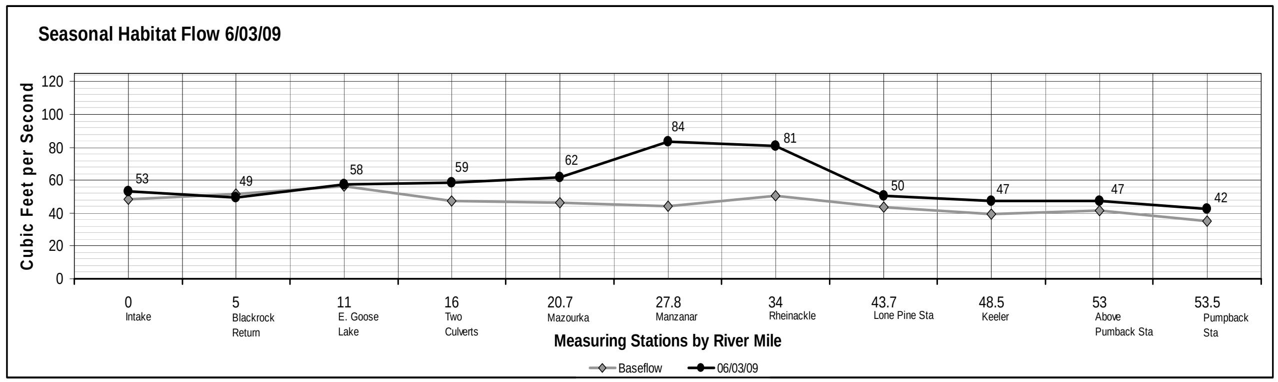


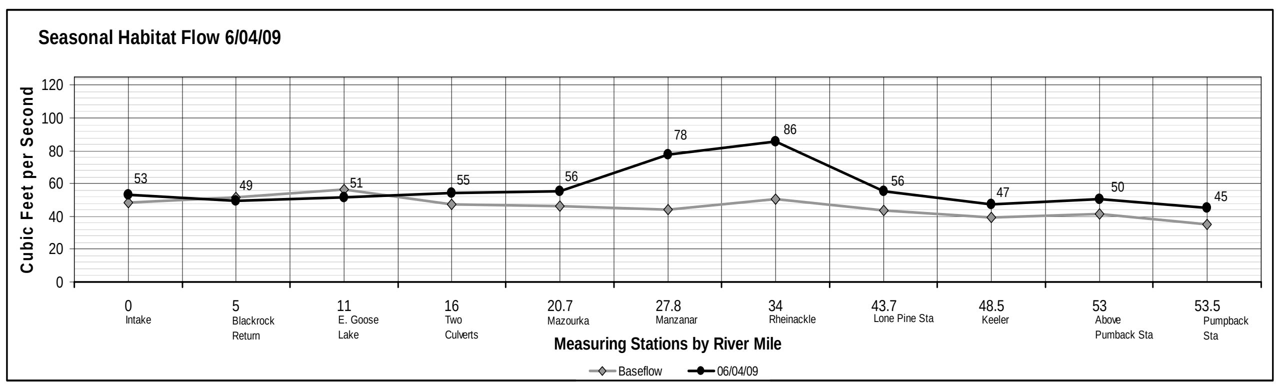
Seasonal Habitat Flow Figure 2, continued. River Flow Days 7-9

Days 10-12 of 24



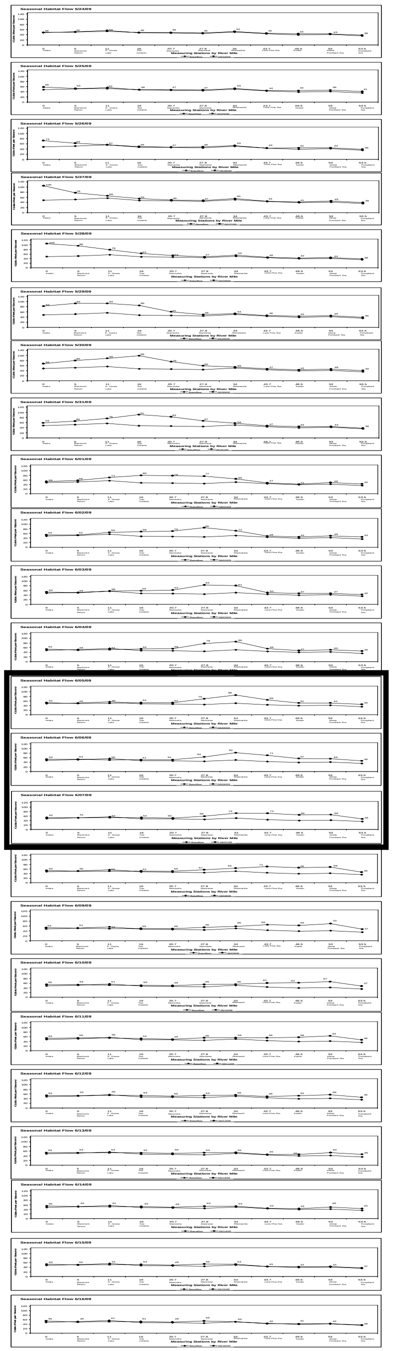


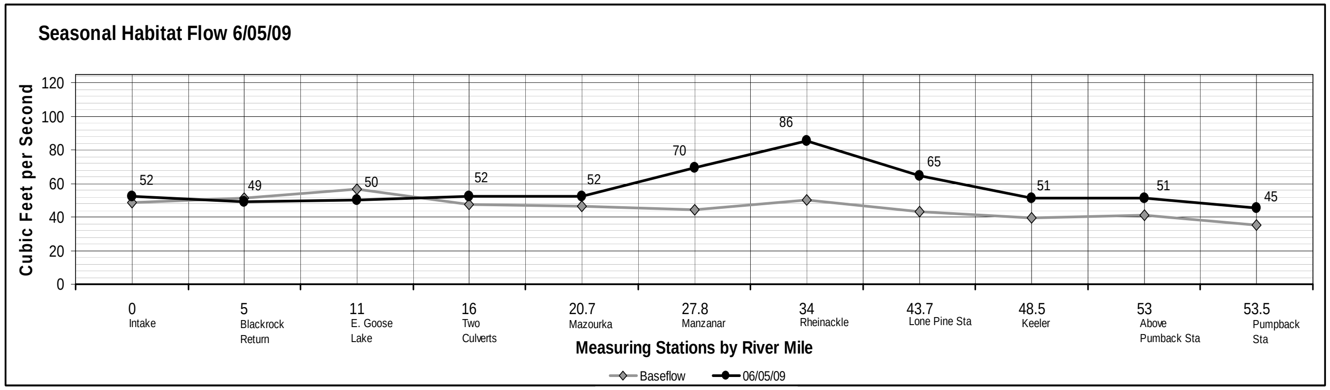


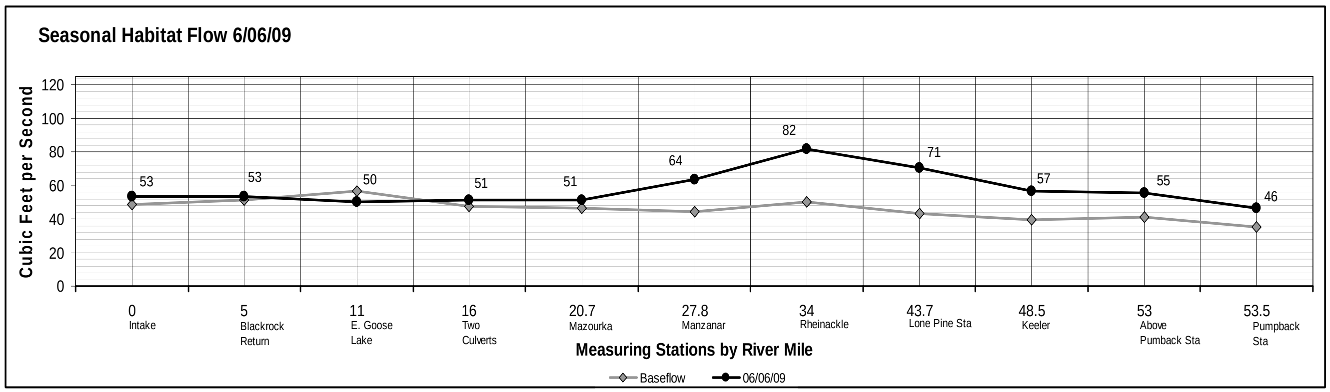


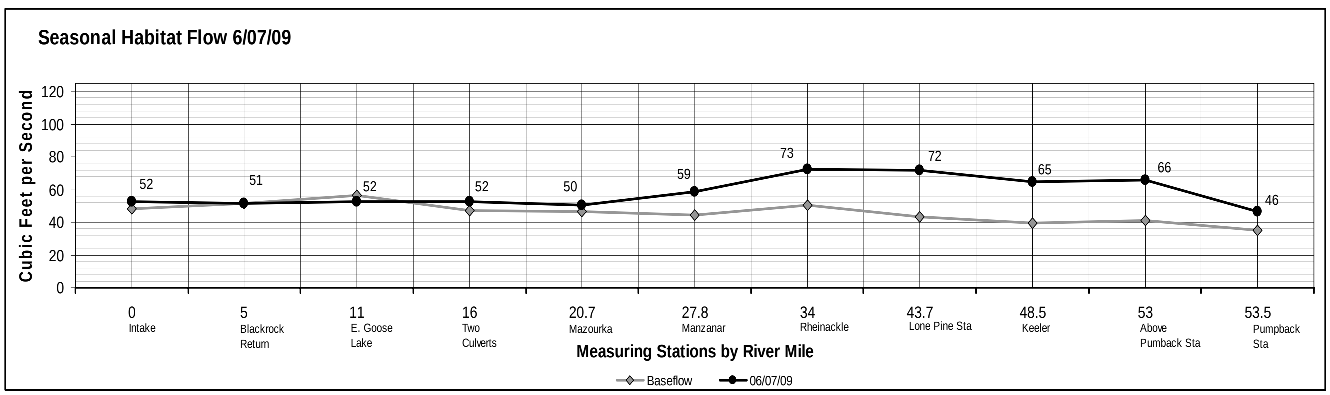
Seasonal Habitat Flow Figure 2, continued. River Flow Days 10-12

Days 13-15 of 24



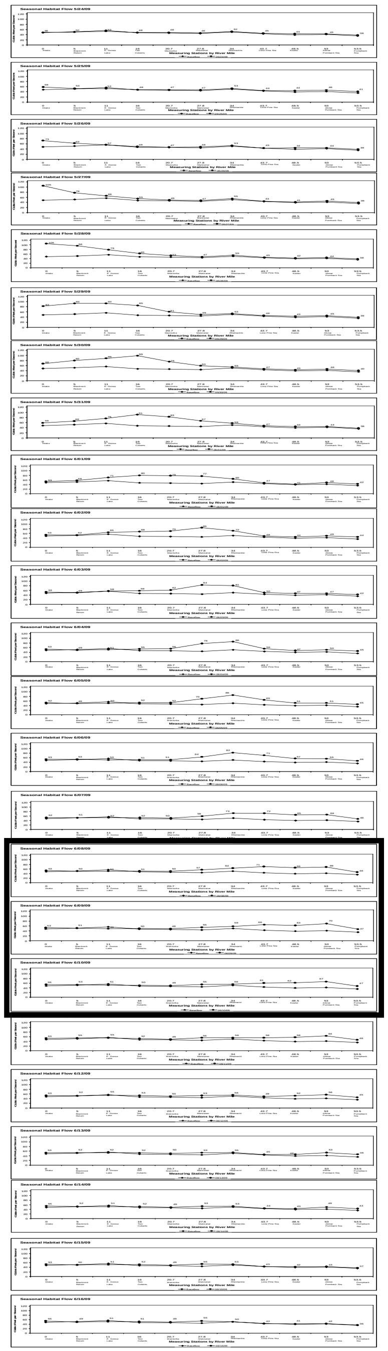


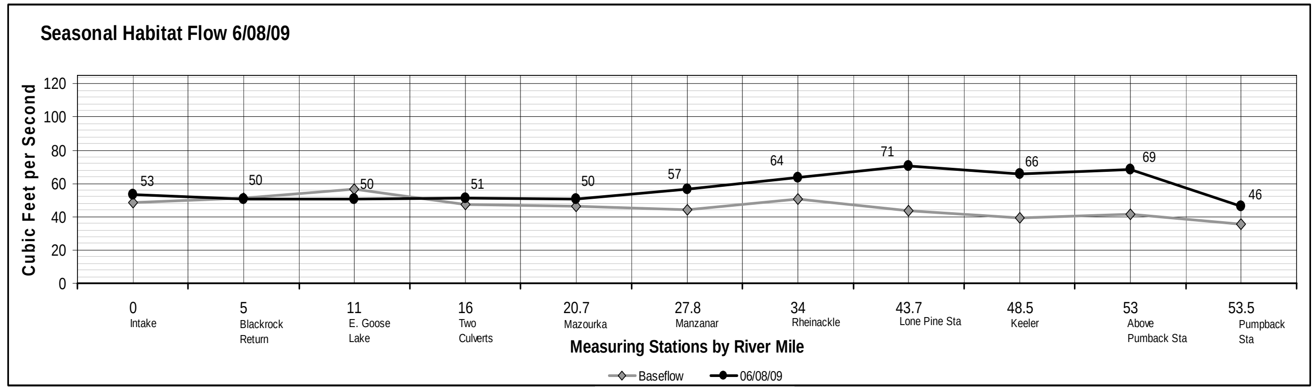


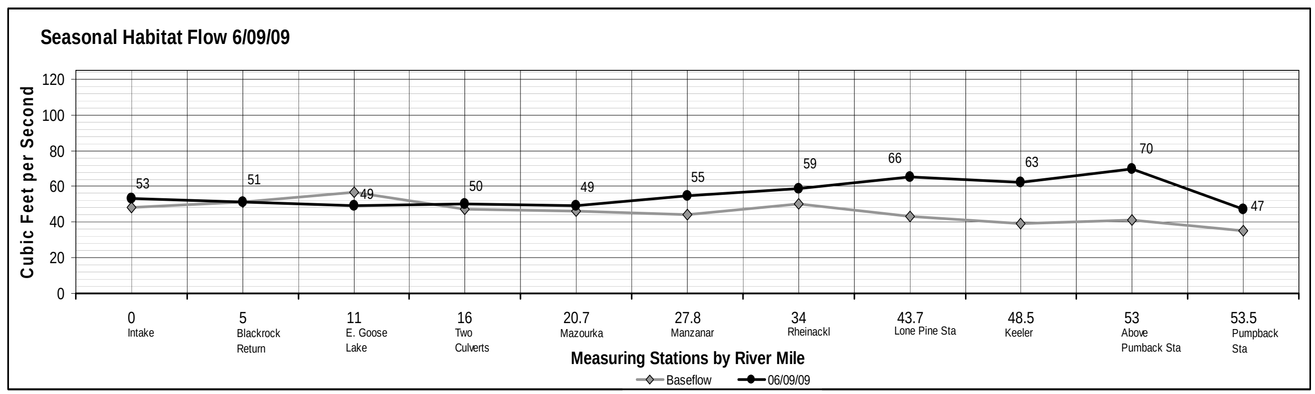


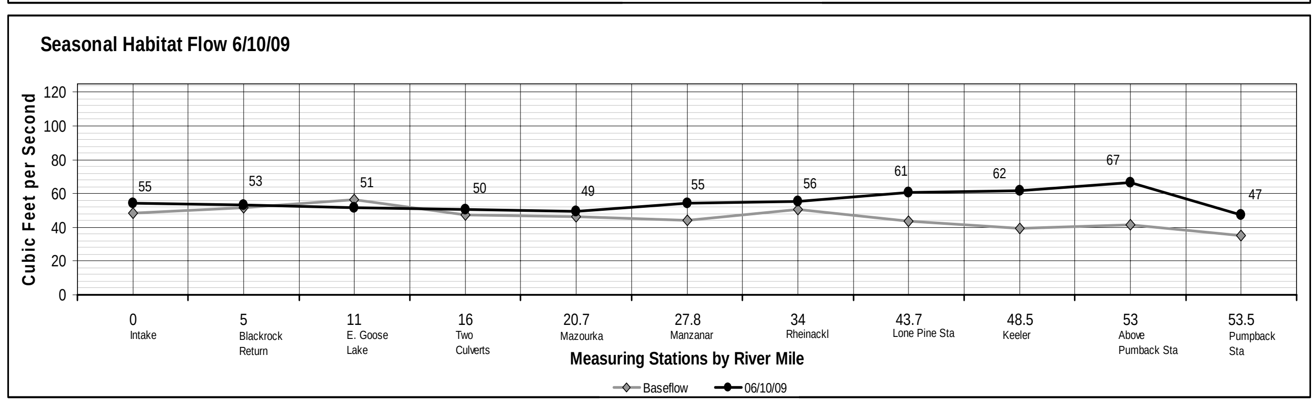
Seasonal Habitat Flow Figure 2, continued. River Flow Days 13-15

Days 16-18 of 24



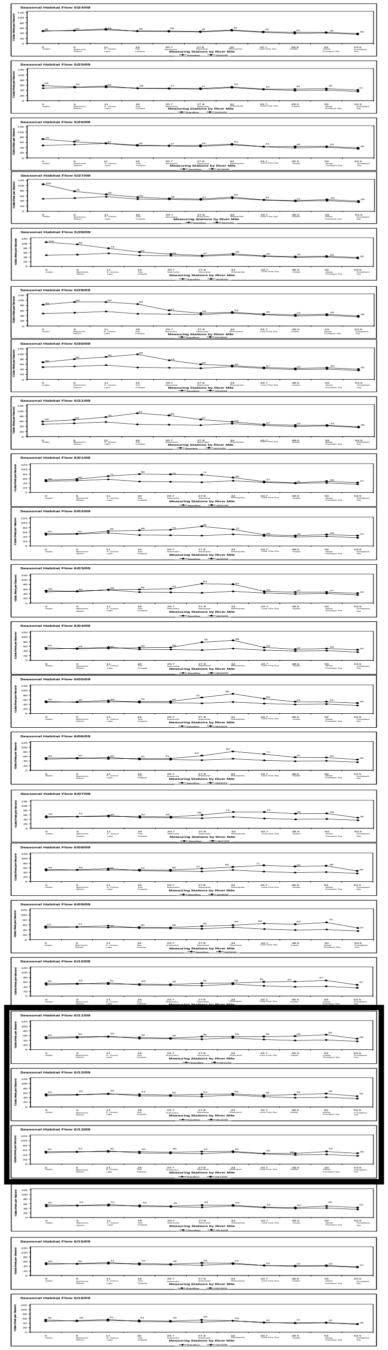


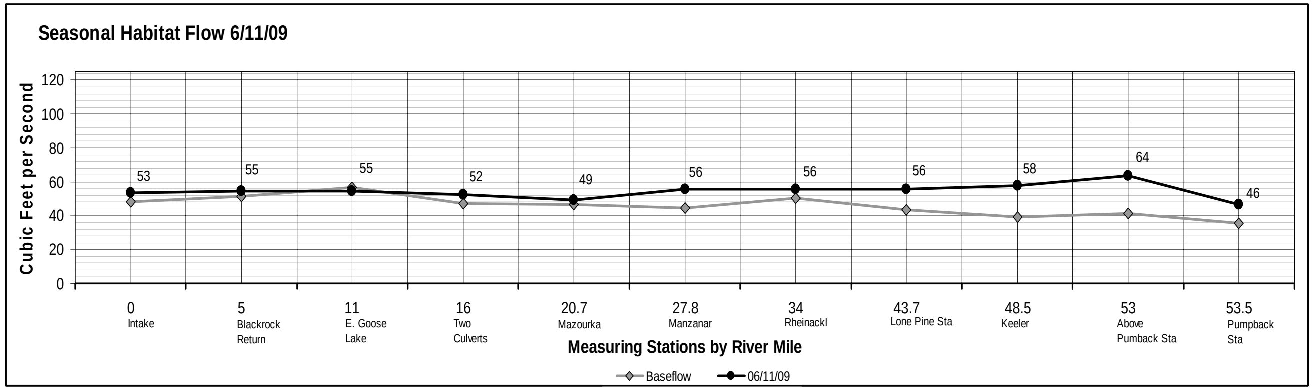


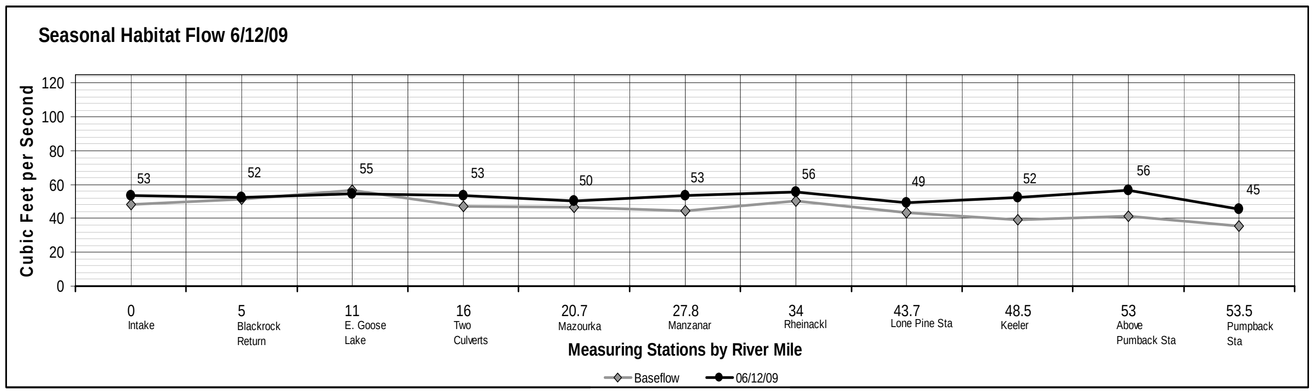


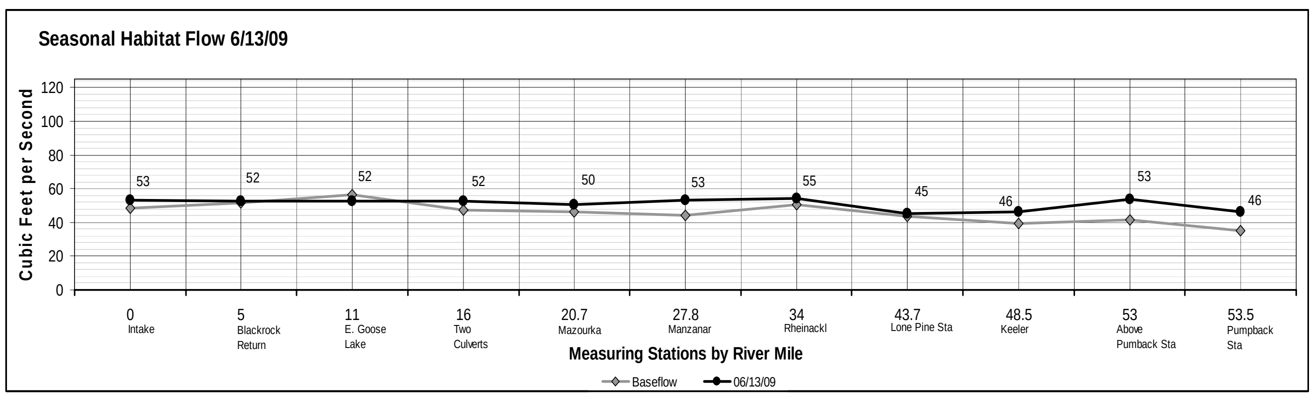
Seasonal Habitat Flow Figure 2, continued. River Flow Days 16-18

Days 19-21 of 24



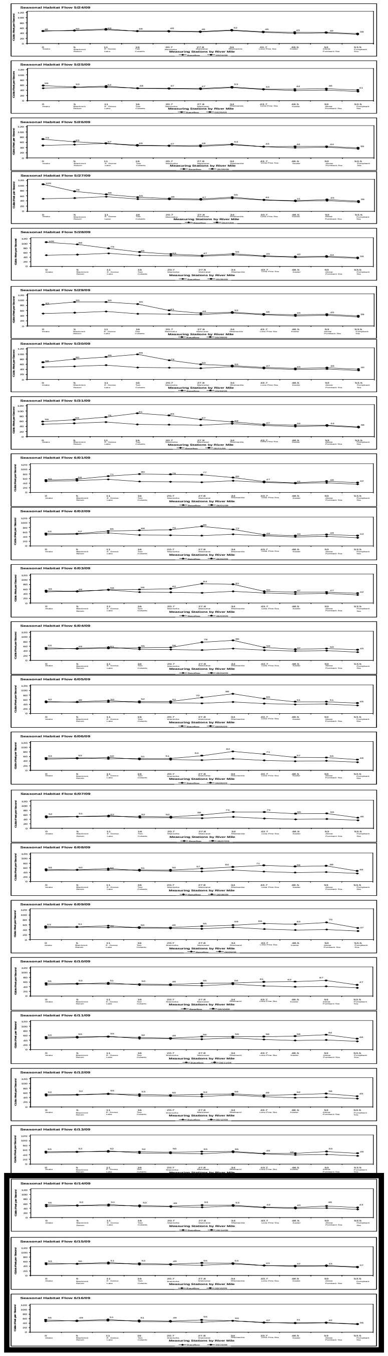


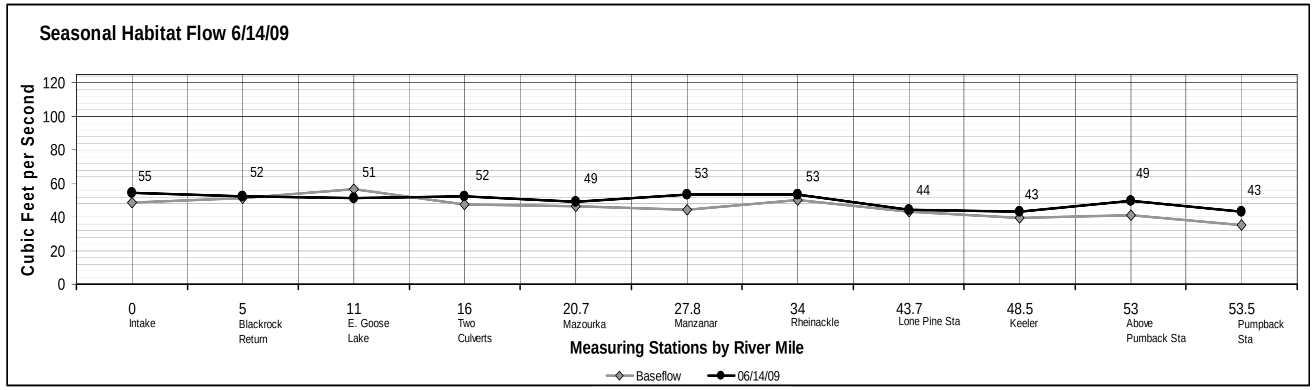


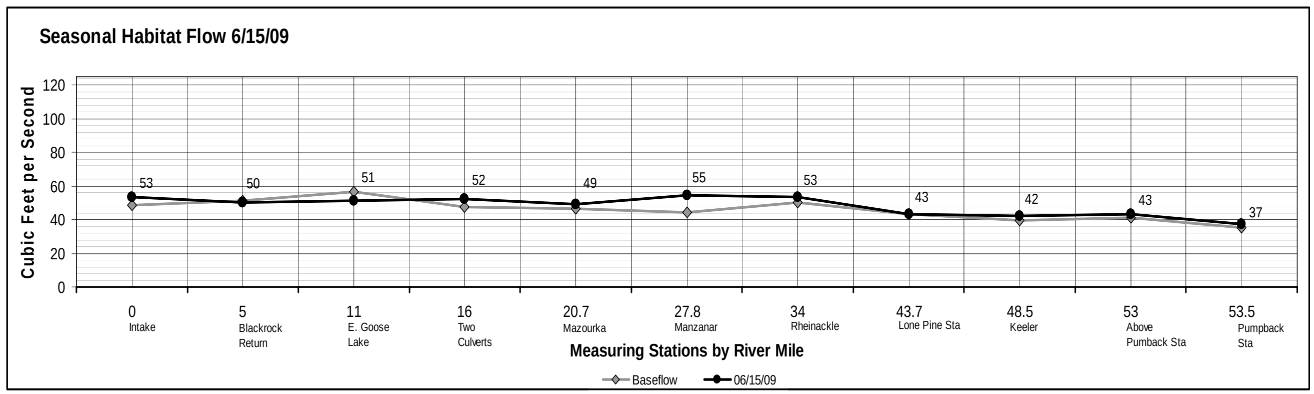


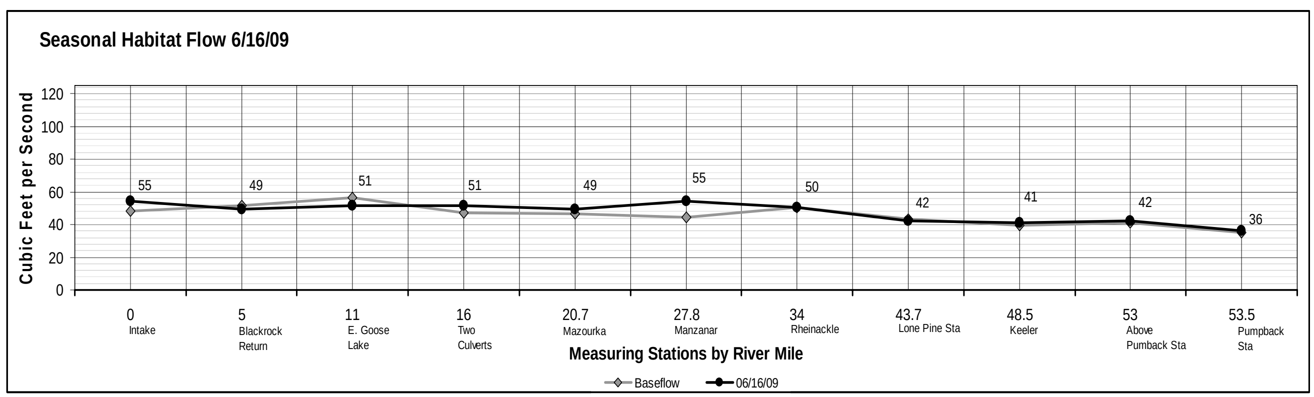
Seasonal Habitat Flow Figure 2, continued. River Flow Days 19-21

Days 22-24 of 24









Seasonal Habitat Flow Figure 2, continued. River Flow Days 21-24

2.6. Hydrographic Analysis

2.6.1. LORP Inflows

Just before the high flow release, the LORP inflows were 48 cfs at the Intake with an additional 12 cfs added down river at various augmentation points. The seasonal habitat flows were scheduled to be released at the Intake as described below. Note that the flow change is not exactly as scheduled as the langemann gate was set high in order to meet or exceed the prescribed seasonal habitat flow, the peak flow that occurred can be found in Seasonal Habitat Flow Table 3.

DATE	TIME	FLOW CHANGE
Sunday May 24	11 a.m.	48-50 cfs
Monday May 25	11 a.m.	50-62 cfs
Tuesday May 26	11 a.m.	62-78 cfs
Wednesday May 27	11 a.m.	78-107 cfs
Thursday May 28	1 p.m.	107-86 cfs
Friday May 29	11 a.m.	86-69 cfs
Saturday May 30	11 a.m.	69-55 cfs
Sunday May 31	11 a.m.	55-48 cfs

2.6.2. Methods of Measurement

The Lower Owens River presents a difficult situation when measuring water flows. The river channel has a flat slope and slow velocities, making it difficult to use standard measuring devices with any accuracy. Flumes and weirs do not have enough channel slope fall to prevent backwater, so LADWP utilizes a meter with ultrasonic technology. The meters installed along the Lower Owens River are located on the channel bottom and project a beam up through the water, measuring both depth and velocity. When combined with the surveyed cross-section of the channel, the meter calculates the measured flow.

2.6.3. Flow Measurement Issues

The ultrasonic meters, combined with manual current metering, provided accurate flow measurements at all stations for the 2009 seasonal habitat flow. In anticipation of silt/sand build-up on the ultrasonic measuring equipment, which would hinder flow measurements, sediment was cleaned and removed from each station prior to the habitat flow. In addition, sediment traps were dug upstream of some of the more problematic (sandier reaches) measuring stations. Just as in the 2008 seasonal habitat flow, there were some instances where vegetation debris had collected and needed to be removed from stations, however, no measurement issues arose from this. Lastly, due to lower flows (as compared to 2008) there were no instances of stations being over-topped ensuring accurate measurements throughout the entire flow event.

2.6.4. Flow Peaks and Travel Times

The time for the peak 110 cfs flow to move down the LORP was approximately 13 days from the Intake to the Pumpback Station. Based on previous studies, the velocities averaged well under 1 ft/sec during the flushing flows. A schedule of the peaks and travel times taken at the Lower Owens River measuring stations is presented in the following table.

Seasonal Habitat Flow Table 3. Flow Peaks and Time Schedule

STATION	BEGIN PEAK	PEAK FLOW (cfs)	TRAVEL TIME (hrs)	TRAVEL TIME FROM INTAKE	DISTANCE (miles)
Intake	May 27, 11 a.m.	110	--	--	--
Blackrock	May 28, 10 p.m.	102	35	1 day, 11 hours	5
East of Goose Lake	May 29, 4 p.m.	104	18	2 days, 5 hours	6
Two Culverts	May 30, 1 p.m.	106	21	3 days, 2 hours	8
Mazourka	May 31, 7 a.m.	82	18	3 days, 20 hours	5
Manzanar	June 2, 11 a.m.	85	52	6 days	7
Reinhackle	June 3, 11 p.m.	89	36	7 days, 12 hours	6
Lone Pine	June 7, 1 p.m.	72	91	11 days, 2 hours	11
Keeler Bridge	June 8, 3 p.m.	69	26	12 days, 4 hours	5
Pumpback Station	June 9, 6 a.m.	74	15	12 days, 19 hours	5

The peak flow at Reinhackle Spring during the 2009 seasonal flow was very similar to the peak flows at Reinhackle Springs during the 2008 winter habitat in that in both cases the peak flows were approximately 80% of the flows released from the Intake. However, conditions during the 2008 winter habitat flows and the 2009 seasonal habitat flows were very different. In 2008, the flows occurred in the winter months when ET was low, vegetation was dormant, and the flows were double of those in 2009. In 2009, the flows occurred during much warmer weather when vegetation was actively growing and at half the peak flow values of 2008. Due to these differences, it is unlikely much inference can be made using flow data collected from the 2008 winter habitat flows when trying to predict what will happen in future seasonal habitat flows.

The travel time for the 2009 seasonal habitat flows to move from Intake to Pumpback Station increased greatly from the 2008 winter habitat flows. In 2008, the total travel time was 8 days, while in 2009 the travel time was 13 days. However, this is not surprising since the flows were much lower in 2009 than in 2008 and since the flows occurred during the different times of year. Both the lower flows and the fact flows occurred during the growing season contributed to the slower travel times.

2.6.5. Photo Monitoring

Photo point monitoring qualitatively records the changing nature of the Lower Owens River throughout the duration of the seasonal habitat flow. Photo points were established at each flow monitoring station within the LORP area (Seasonal Habitat Flow Figure 3). Generally, photos were taken from a fixed position facing upstream, downstream, and across the river channel. Multiple pictures from each location quantitatively records water surface elevation changes per day associated with the seasonal habitat flow. Photo points also record the effect of the seasonal habitat flow on LADWP/Inyo County infrastructure (LAA Intake, Culverts, Pumpback Station). Additionally, pictures of interest were taken of areas near each flow monitoring station. For example, several flow monitoring stations have staff gages and pictures of these gages were taken at various water flows.

Photos were taken using a digital camera. Photo location, date of photo, time of photo, direction facing, and a description of the photo recorded on photo record. Each monitoring day, upon returning from the field, photos were downloaded to a computer and named. Photo point monitoring of the seasonal habitat flow occurred from May 24, 2009 to June 16, 2009.

2.7. Water Quality

2.7.1. Background

Water quality monitoring was performed by ICWD personnel. Methods and summary of results are presented here, and the data and tables are provided in Appendix 3A.

2.7.2. Environmental & Regulatory Setting

The LORP Monitoring, Adaptive Management, and Reporting Plan describes water quality monitoring protocols and pertinent issues in detail (pages 3-47 to 3-49, and 4-11 to 4-14).

2.7.3. Water Quality Methods

Water quality for the 2009 seasonal habitat flow was monitored at the following locations: Mazourka Canyon Road, Manzanar Reward Road, Reinhackle Springs Station, and Keeler Bridge. In the course of monitoring water quality during the 2009 habitat flow the Quanta water quality instrument failed. The turbidity sensor failed at the start of the program, and all sensors had failed by early June. One of the continuous recorders was moved from Manzanar Reward Road to the Reinhackle Spring location after the peak of the habitat flow had passed the Manzanar Reward Road station to compensate for the failed Quanta manual multi-probe. The move was approved by LADWP and ICWD staff involved in the habitat flow release. Despite the failure of the Quanta, data of adequate quantity and quality were acquired by the continuous recorders and test kits to satisfy the purpose of the water quality monitoring described in the EIR (LADWP 2004).

2.7.4. Results

Three of the monitoring stations (Manzanar Reward Road, Reinhackle Spring Station and Keeler Bridge) experienced moderate drops in dissolved oxygen levels as the habitat flows passed these stations. Some of the stations experienced slight elevations of other water quality parameters. None of the water quality thresholds were reached (Seasonal Habitat Flow Table 4). Fish stress was not observed at any of the four water quality stations at any time during habitat flows. Low air and water temperatures and relatively low peak flows may have combined during this habitat flow release to minimize dissolved oxygen declines.

It is possible, based on what was observed during the 2009 spring habitat flow release, that when larger habitat flows are released in warmer weather with higher ambient water temperatures after early April Owens Valley runoff forecasts, dissolved oxygen levels could decline to levels of concern (at or below 1.0 mg/L) as the peak of habitat flows pass the lower three monitoring stations (Manzanar Reward Road, Reinhackle Station and Keeler Bridge) in the Lower Owens River. This condition may improve with time as fines are entrained in the lower river reaches.

Seasonal Habitat Flow Table 4. Water Quality and Fish Condition Thresholds

CONSTITUENT OR OBSERVATION	THRESHOLD
Dissolved Oxygen	1.0 mg/L and downward trend in data (Changed to 1.0 mg/L and a downward trend in data)
Hydrogen Sulfide	0.030 mg/L
Ammonia	Acute Criterion (one-hour average concentration) for Non-Salmonids (pH dependent)
Fish Conditions	The condition of fish visible at each station will be observed for evidence of stress such as excessive jumping, lying motionless near the surface, rapid gill movement, and poor coloring or body appearance. The threshold will be observance of one or more of these behaviors in several fish.

2.8. Base Flow and Flooded Extent Mapping

Aerial digital imagery taken from multiple helicopter flyovers of the LORP study area were used to map the base flow and the flooded extent before and during the seasonal habitat flows. Digital still images and ground surveys were used to ground-truth the flooded extent data derived from the aerial digital imagery. These data were used to derive the amount of area flooded (expressed in acres), the types of landforms flooded, and the cover types flooded at different intervals during the seasonal habitat flow event. These methods are described below. Note that flow measurements discussed through the rest of Section 2 are daily averages not peak measurements.

2.8.1. Site Scale - Plot Mapping Analysis Methods

Aerial digital video was taken at base flow (year-round flow of equal to or greater than 40 cfs) prior to initiation of the seasonal habitat flow, and during the ramping of the flows. LADWP staff used a geo-referenced *FLIR Systems* stabilized digital video camera mounted on the LADWP helicopter (Seasonal Habitat Flow Figure 3), which allowed for easy location of video frames in geographic space. The helicopter flights generally progressed from south to north beginning with Owens Lake and followed the Lower Owens River channel north to the LAA Intake. LADWP staff narrated the aerial video as they flew over landmarks such as roads and stream confluences. The helicopter's altitude, bearing, and angle of view were recorded on the video and was viewable onscreen (Seasonal Habitat Flow Figure 4) and varied depending on weather conditions and width of the floodplain.

Seasonal Habitat Flow Figure 3. LADWP Helicopter with Mounted FLIR Unit

Six helicopter flights were conducted over 18 days from May 21 to June 8 (Seasonal Habitat Flow Table 5). On May 21, prior to initiation of habitat flows, a helicopter flight recorded the base flow conditions. Video from days that represent the highest flows (see highlighted flows on Seasonal Habitat Flow Table 5) were used to map the seasonal habitat flow event. The aerial video imagery was used to digitize flooded extent in *ArcView 9.3*. Base flow and seasonal habitat flow flooded extent were digitized on screen, side-by-side with the digital video imagery. *ArcView* shapefiles created during the digitizing process were named by plot, date of imagery acquisition and flow at the closest monitoring station. Mapping was conducted at five (2 km in length) plots representative of the various Lower Owens River reaches. Section 4.2.7.2 of the LORP Monitoring, Adaptive Management and Reporting Plan (Ecosystems Sciences, 2008) describes the five plots used in the overall monitoring of the LORP in greater detail. Plots are located in three of the four reach types (dry incised floodplain, wet incised floodplain, graded wet floodplain, and aggraded wet floodplain) of the Lower Owens River (WHA 2004).

Seasonal Habitat Flow Table 5. Average Daily Flow (cfs) and Date of Helicopter Flights

River Flow Measuring Station / Date	Intake	Blackrock	East of Goose	Two Culverts	Mazourka	Manzanar	Reinhackle	Lone Pine	Keeler Bridge	Above Pumpstation	Pumpback
May 21*	48	51	57	47	46	44	50	43	39	41	35
May 22	48	52	58	48	47	44	49	44	42	43	37
May 23	46	48	58	49	47	46	50	45	43	46	40
May 24	48	50	53	48	48	46	52	45	43	43	38
May 25	59	53	52	48	47	47	53	44	44	46	41
May 26	73	63	57	49	47	48	53	43	44	44	39
May 27	105	78	66	55	49	47	55	44	41	45	39
May 28*	105	96	79	63	53	47	55	45	42	44	38
May 29	83	93	93	85	61	49	53	46	43	45	39
May 30*	68	80	89	99	76	60	55	47	43	46	40
May 31	59	66	76	91	83	67	58	47	44	44	38
June 1*	53	58	71	80	79	77	65	47	41	48	42
June 2	53	52	65	68	70	85	72	48	44	49	44
June 3	53	49	58	59	62	84	81	50	47	47	42
June 4*	53	49	51	55	56	78	86	56	47	50	45
June 5	52	49	50	52	52	70	86	65	51	51	45
June 6	53	53	50	51	51	64	82	71	57	55	46
June 7	52	51	52	52	50	59	73	72	65	66	46
June 8*	53	50	50	51	50	57	64	71	66	69	46
June 9	53	51	49	50	49	55	59	66	63	70	47
June 10	55	53	51	50	49	55	56	61	62	67	47
June 11	53	55	55	52	49	56	56	56	58	64	46
June 12	53	52	55	53	50	53	56	49	52	56	45
June 13	53	52	52	52	50	53	55	45	46	53	46
June 14	55	52	51	52	49	53	53	44	43	49	43
June 15	53	50	51	52	49	55	53	43	42	43	37
June 16	55	49	51	51	49	55	50	42	41	42	36

* Date of Helicopter Flight with Aerial Video

During the helicopter flights, staff captured high quality digital still frames that aided in the mapping process. Still frame digital images of plots were taken using a *Canon Powershot* digital camera. These photos were used during the digitizing process as they often had better resolution than the digital video.

As part of the ground surveys, GPS points of the wetted extent were taken on both sides of the river channel at three of the five plots (Plots 2, 4, and 5) along transects placed 100 meters apart (Section 4.2.7.2 of the *LORP Monitoring, Adaptive Management and Reporting Plan*). An effort was made to survey sites when they were close to the peak flows. It was often difficult to determine the precise day that peak flows would move through a site. Field maps depicting the study site with study plot transects and fence posts were generated and brought to the field along with a GPS (loaded with plot information, including river shape, transects and fencepost). LADWP personnel walked along the rivers flooded edge, mapping the flooded extent on their field maps. GPS points were taken where transects intersected the flooded extent. In some cases there were multiple wetted edges along each transect due to oxbows and other landform features. These GPS points were used in the digitizing process to ensure that wetted extent margins were mapped correctly. On-the-ground GPS data allowed accurate identification of off-channel inundated areas that were most likely filling with water via groundwater.

Additionally, a series of aerial photos were taken of the Owens valley during early August 2009 as part of a separate monitoring effort. These images were stiched together and used as a background for digitizing.

Data from the video imagery, digital photos, and ground surveys were compiled to create a total of 10 shapefiles during the digitizing process; one shapefile per plot for base flow and one shapefile per plot for the high flow. Seasonal Habitat Flow Table 5 highlights the date and measuring stations used to identify the flow per helicopter flight and map the flooded extent along the Lower Owens River channel.

2.8.2. Flooded Area by Plot

Flooded area is used to determine the amount of area (expressed in acres) flooded during the seasonal habitat flows. Flooded area per plot for the base flow and the high flows (Seasonal Habitat Flow Table 6) was determined using each GIS shapefile mapped from the wetted extent data. Every feature (polygon) within a shapefile has its area derived. Each feature's area per shapefile was summed to derive the overall flooded area per flow.

Seasonal Habitat Flow Table 6. Flooded Area by Plot at Base Flow and High Flow

Plot	Flight Date	Flow (cfs)	Measuring Station	Plot Size (Acres)	Flooded (Acres)	Percent Flooded
1	5/21/2009	57	East of Goose	159.9	6.0	3.8%
1	5/30/2009	89	East of Goose	159.9	14.3	8.9%
2	5/21/2009	47	Two Culverts	164.7	23.4	14.2%
2	5/30/2009	99	Two Culverts	164.7	33.6	20.4%
3	5/21/2009	50	Reinhackle	153.1	39.6	25.9%
3	6/4/2009	86	Reinhackle	153.1	51.5	33.6%
4	5/21/2009	43	Narrow Gage	168.8	58.8	34.8%
4	6/8/2009	71	Narrow Gage	168.8	80.4	47.6%
5	5/21/2009	39	Keeler Bridge	215.9	25.7	11.9%
5	6/8/2009	66	Keeler Bridge	215.9	44.3	20.5%

2.8.3. Landform Types Flooded by Plot

Whitehorse Associates (WHA) mapped the landforms of the Lower Owens River in 2004 (WHA 2004). This mapping effort was performed before LORP flows were initiated which leads to abnormally high percentage of inundation on these landforms, since these areas are now inundated at baseflow. Key landforms that were identified in the plots include floodplain, low terrace, and high terrace. The *ArcGIS Analysis Tool Intersect* was used to clip the landform type shapefile to each flooded extent shapefile (base flow and high flow associated with seasonal habitat flow). The landform and the wetted extent shapefiles were used to determine the landform types that were inundated during the seasonal habitat flows. Inundated landform type acreages were summed to determine the total acreage per landform type flooded during different flows (Seasonal Habitat Flow Table 6). The percent landform type flooded per plot was derived by dividing inundated landform type by the total acres of that landform type per plot (Seasonal Habitat Flow Table 7).

2.8.4. Cover Types Flooded by Plot

The cover types of each plot were mapped in 2002 (Risso 2007). A description of the cover types is provided in Appendix 2C. Similar to the landform types flooded per plot, the *ArcGIS Analysis Tool Intersect* was used to clip each plot's cover type shapefile to each flooded extent shapefile (base flow and high flow associated with seasonal habitat flow). This resulted in new shapefiles that integrate cover type and flooded extent attribute data for each plot. Total acreages for each vegetation cover type inundated per flow (base flow and high flow) are summarized in Seasonal Habitat Flow Table 8.

2.9. Reach and River-Wide Analysis Methods

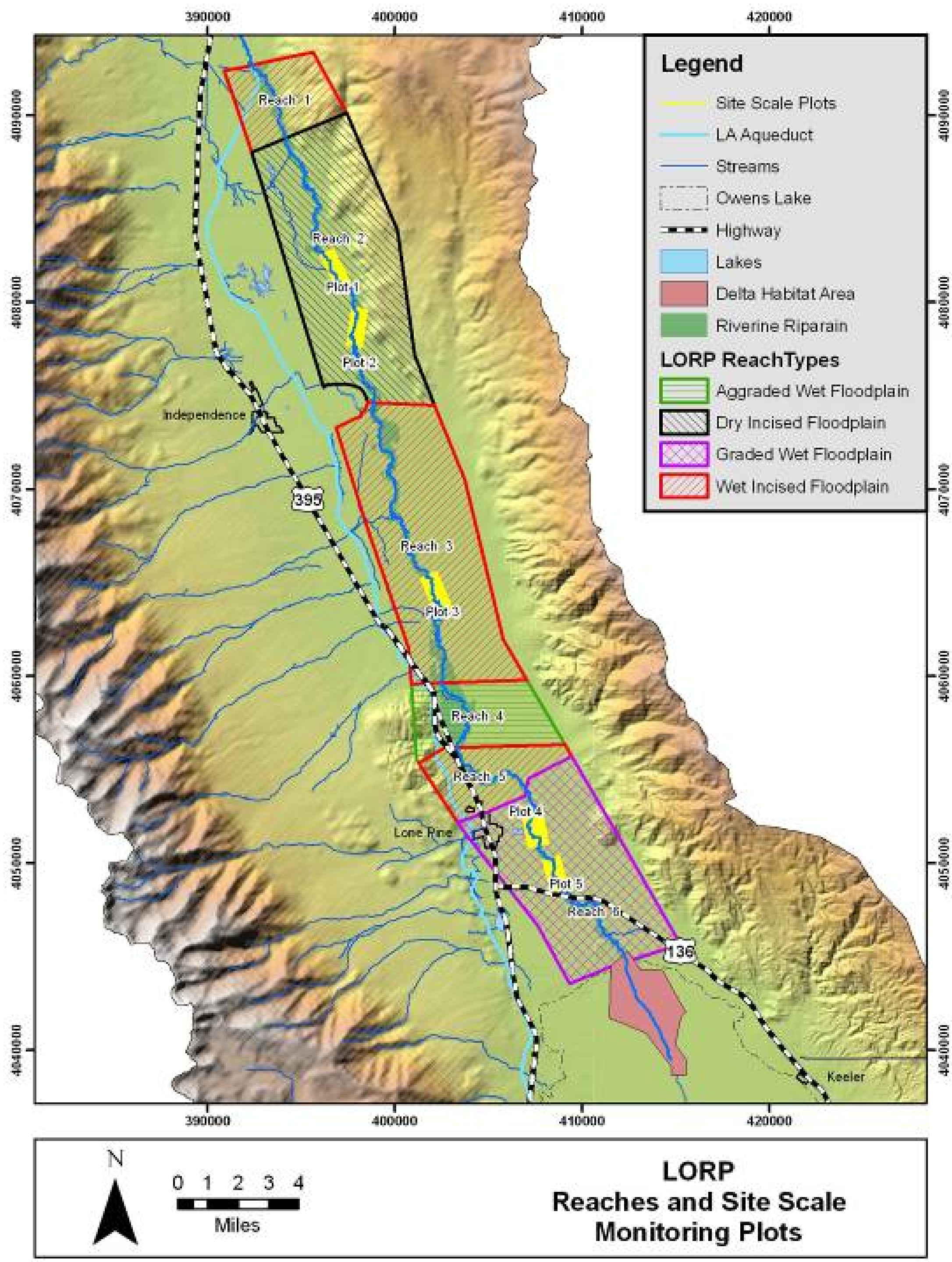
Results derived from the site scale analysis, described above, were used to extrapolate inundated conditions by reach type, and then to the entire Lower Owens River. The extrapolation of flooded area per landform for each reach type (dry incised floodplain, wet incised floodplain, graded wet floodplain, and aggraded wet floodplain) was conducted for base flow and seasonal habitat flows. Lower Owens River reaches were designated and described by White Horse and Associates (WHA 2004). The six Lower Owens River reaches were assigned reach types; one reach type can be used to describe multiple reaches.

Extrapolation of flooded area per landform occurred in 3 of the 4 Lower Owens River reach types (dry incised floodplain, wet incised floodplain, and graded wet floodplain) (WHA 2004). Reach 4, which is the forth reach type (aggraded wet floodplain) has no site scale plots established in this reach. Therefore inundation was evaluated using just the aerial photography and comparisons with flood extent changes in surrounding reaches. The aerial photography showed that 85% of the reach 4 floodplain landform was inundated during the high flows, while only 50% of the floodplain was inundated at base flows (Seasonal Habitat Flow Figure 4). More discussion of reach 4 floodplain inundation can be found in Section 2.10.3.

Extrapolation of high flow inundation at each plot to peak flow or 200 cfs as performed in the 2008 Seasonal Habitat Flow Report (Ecosystem Sciences 2008) was not performed because the peak flow or very close was captured by either the helicopter video, on the ground mapping or both. The plots were not captured at peak flow during the 2008 seasonal habitat flow.

Seasonal Habitat Flow Figure 4. Aerial FLIR Image of the Islands Area (Reach 4) at Base Flow (left) and High Flow (right).

Flooded area, for both baseflow and high flow, per reach type for Lower Owens River was extrapolated by using a plot's (or multiple plots') percent landform type inundated as a multiplier (Seasonal Habitat Flow Table 7). Thus, to determine a reach types' acres inundated for each landform, the percent inundated per landform at the plot level was used as a multiplier (see percent inundated column in Seasonal Habitat Flow Tables 9 and 10); this number was multiplied by the acres per landform for each reach type to calculate total acres inundated per landform per reach type. In reach types where multiple plots occurred, such as dry incised floodplain and graded wet floodplain, the average of those plots percent inundated of each landform type were used as multipliers to extrapolate to the reach type.



Seasonal Habitat Flow Figure 5. River Reaches and Site Scale Monitoring Plots

2.10. Results and Discussion

2.10.1. Base Flow and Flooded Extent Mapping

Results of the analyses described in Sections 2.8.1 and 2.9 are presented at two different scales: the site or plot scale and the river reach/river-wide scale. The site scale section describes the results of the site scale mapping, which included digital aerial imagery mapping collected by LADWP's helicopter, digital aerial still images, and ground surveys. The variable such as percent landform type flooded per plot was derived from analysis of the site scale mapping and was used to extrapolate to the entire Lower Owens River.

Generally, results are presented by plot and flow. Flow results per plot were recorded at base flow and high flows. Base flow results depict a point-in-time measurement. This year the flooding extent at base flow was mapped as recorded on May 21, 2009. The flooded extent results at base flow conditions are not extrapolated to the court ordered minimum 40 cfs, but rather represent the flooded extent based on the flow measured at the applicable monitoring station on May 21, 2009. Base flows are not consistent throughout the entire river, as the Lower Owens has losing and gaining reaches.

Measured flow on May 21, 2009 (Base flow mapping) ranged from 39 cfs to 57 cfs for all measuring stations. The variables derived from the base flow analysis (e.g. percent landform inundated/plot) were used to extrapolate to the reach and then to the entire river.

The high flow results depict the flooding extent per plot per flow on the days of the helicopter flights. These results also demonstrate a point-in-time measurement; the highest daily average flow measured per helicopter flight day. High flows ranged from 66 cfs to 99 cfs for the plot analysis. (Refer to Seasonal Habitat Flow Table 5.)

2.10.2. Site Scale - Plot Analysis Results

Flooded area per plot varied considerably for base flows and high flows associated with the seasonal habitat flow. Seasonal Habitat Flow Table 6 shows the percent flooded area per plot at base flow and high flow levels. Plot 1 had the lowest percent of its area flooded under both flows (3.8% at 57 cfs and 8.9% at 89 cfs), while Plot 4 experienced the highest percent of its area flooded under both flow scenarios (34.8% at 43 cfs, and 47.6% at 71 cfs). Generally, flooded area increased incrementally with flow, but not at the same rate over all plots (Seasonal Habitat Flow Figures 6-10). For example, Plot 1 experienced a flooded area increase of only 5.1% with a flow change of 32 cfs, while a flow increase of 28 cfs resulted in a 12.8% increase in flooded area in Plot 4. (Refer to Seasonal Habitat Flow Table 6).

Seasonal Habitat Flow Table 7. Landform Acreage Inundated and Percent of Total Landform Inundated by Plot at Base Flow and High Flow

Plot	Flow (cfs)	Total Flooded Area (Acres)	Floodplain (Acres)	Floodplain (%)	Low Terrace (Acres)	Low Terrace (%)	High Terrace (Acres)	High Terrace (%)
1	57	6.0	5.2	14.3%	0.0	0.0%	0.8	0.6%
	89	14.3	11.5	31.3%	0.0	0.0%	2.8	2.3%
2	47	23.4	21.6	48.0%	0.0	0.0%	1.7	1.5%
	99	33.6	29.2	64.8%	0.0	0.0%	4.3	3.6%
3	50	39.6	30.2	83.2%	10.8	12.5%	0.2	0.5%
	86	51.5	33.1	91.3%	18.5	23.5%	0.9	2.1%
4	43	58.8	54.2	60.1%	4.8	6.4%	0.0	0.0%
	71	80.4	68.2	75.6%	11.7	17.3%	0.0	0.0%
5	39	25.7	20.3	32.0%	5.5	3.8%	0.0	0.0%
	66	44.3	34.6	54.7%	9.1	6.8%	0.0	0.0%

The percent landform type flooded per plot also varied considerably, demonstrating the range of landform types and conditions found within the Lower Owens River. For example, Plot 1, located in the dry incised floodplain reach type, contains narrow floodplains flanked by high terraces, experienced flooding on only 14.3% of its floodplains during base flows and 31.3% during high flows. In contrast, Plot 4, located in the graded wet floodplain reach type, which contains a mix of floodplains and low terraces flanked by high terraces (WHA 2004), experienced flooding on 60.1% of its floodplains at base flow and 75.6% at high flows with a similar increase in low terrace inundation and no high terrace inundation. (Refer to Seasonal Habitat Flow Table 7.)

The number of acres inundated for each cover type per plot at base flows and during high flows is presented in the Seasonal Habitat Flow Table 8. All cover types except for Seepweed-Saltbush experienced some flooding during the high flows. Most flooding occurred in cover types that are located on floodplains and near the river channel. Under base flow conditions, Willow/Cattail-Rush Wetland, Gooding's Willow Woodland, and Tamarisk/Saltbush Woodland experienced the greatest flooded area. At high flows, the same cover types were most often inundated. The difference in flooded area between base flow and high flow was greatest for the Saltgrass Meadow, Tamarisk/Saltbush Woodland, and Gooding's Willow Woodland cover types. These vegetation types and landforms represent appropriate areas for willow and cottonwood recruitment and establishment, an objective of the seasonal habitat flows. (Refer to Seasonal Habitat Flow Table 8.)

Seasonal Habitat Flow Table 8. Acres of Cover Types Inundated by Plot

See Appendix 2C for description of vegetation types.

Plot	CFS	Alkali Sacaton/Saltgrass Meadow	Baltic Rush-Saltgrass Wet Meadow	Barren Ground	Bullrush-Cattail-Willow Wetland[1]	Chairmaker's Bullrush-Saltgrass Wet Meadow[1]	Common Reed-Coyote Willow/Yerba Mansa	Coyote Willow/Saltgrass Riparian Shrubland	Gooding's Willow Woodland	Greasewood/Russian Thistle Scrub	Greasewood/Seepweed-Shadscale Scrub	Greasewood-Saltbush Scrub	Open Water	Rabbitbrush-Saltbush/Saltgrass Scrub Meadow	Saltbush/Russian Thistle Scrub	Saltbush/Saltgrass Scrub Meadow	Saltgrass Meadow	Seepweed-Saltbush/Saltgrass Scrub Meado	Shadscale Scrub	Smotherweed-Mixed Shrubland	Sunflower-Licorice Wet Meadow	Tamarisk/Saltbush Woodland	Unknown	Wildrye-Saltgrass Meadow	Willow/Cattail-rush Meadow[1]
		Base Flow																							
Plot 1	57	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.3	0.0	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	4.3	0.0	0.0	0.0
Plot 2	47	0.0	0.0	0.9	0.0	0.0	0.0	0.0	4.1	0.3	0.0	0.3	0.0	0.0	1.6	0.3	0.0	0.0	0.0	0.0	0.0	15.7	0.6	0.0	0.0
Plot 3	50	1.0	1.6	0.1	1.2	2.4	0.6	0.1	7.7	0.0	0.1	0.0	1.7	1.6	0.0	0.6	1.6	0.0	0.0	0.1	0.2	1.2	0.0	0.5	17.4
Plot 4	43	0.3	0.6	0.1	7.3	1.8	2.3	0.5	6.0	0.0	0.0	0.0	9.7	0.4	0.0	1.2	3.5	0.0	0.0	0.1	0.7	0.1	0.0	0.6	23.8
Plot 5	39	0.1	0.2	0.0	3.4	0.8	0.3	1.2	5.8	0.0	0.1	0.0	4.4	0.3	0.0	0.3	1.1	0.0	0.0	0.0	0.5	0.1	0.0	0.2	7.0
Baseflow Total (Acres)		1.3	2.3	1.9	11.9	4.9	3.2	1.8	23.7	0.5	0.2	0.5	15.8	2.6	1.6	2.4	6.3	0.0	0.0	0.1	1.4	21.4	0.6	1.3	48.2
		High Flow																							
Plot 1	89	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.4	1.0	0.0	0.4	0.0	0.4	0.3	0.3	0.0	0.0	0.0	0.0	0.0	10.1	0.0	0.0	0.0
Plot 2	99	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.8	0.0	1.2	0.0	0.0	2.9	0.5	0.0	0.0	0.0	0.0	0.0	21.1	0.6	0.0	0.0
Plot 3	86	2.5	1.9	0.2	1.3	2.8	0.7	0.2	10.3	0.0	0.3	0.0	1.8	4.2	0.0	1.4	2.3	0.0	0.0	0.1	0.3	1.9	0.0	1.0	18.3
Plot 4	71	0.9	1.8	0.2	8.3	2.8	3.2	0.6	9.5	0.0	0.0	0.0	10.4	1.3	0.0	1.8	7.5	0.0	0.1	0.1	1.1	0.3	0.0	0.9	29.4
Plot 5	66	0.3	0.6	0.0	5.5	1.0	2.9	2.8	12.2	0.0	0.1	0.0	4.6	0.7	0.0	0.5	2.1	0.0	0.0	0.0	2.3	0.1	0.0	0.7	8.0
High Flow Total (Acres)		3.7	4.4	3.0	15.0	6.6	6.8	3.6	32.4	1.8	0.5	1.7	16.8	6.7	3.2	4.5	11.9	0.0	0.1	0.2	3.7	33.5	0.7	2.5	55.6
Increase		**2.4**	**2.1**	**1.1**	**3.1**	**1.7**	**3.6**	**1.8**	**8.7**	**1.4**	**0.3**	**1.1**	**1.0**	**4.1**	**1.5**	**2.0**	**5.6**	**0.0**	**0.1**	**0.1**	**2.3**	**12.1**	**0.0**	**1.2**	**7.5**

[1]Vegetation type is emergent and thus most likely inundated prior to seasonal habitat flow.

2.10.3. Reach-River Wide Results

The results derived from the site scale analysis were used to extrapolate the amount of inundated acres by reach type, reach, landforms per reach type, and to the entire Lower Owens River. River reaches responded in dynamic ways to flows, illustrating the usefulness of reach designation. Understanding the nature of these responses will aid managers in creating realistic goals and expectations for individual reaches. Acres inundated for both base flow and seasonal habitat flow were extrapolated from observed conditions. Flooding area per reach varied throughout the Lower Owens River as did the amount of landform flooded per reach type. Generally, flooded area per reach and landform increased with the onset of the seasonal habitat flow, but was not consistent among reaches.

Under base flow conditions, the wet incised floodplain reach type (Reaches 1, 3 and 5) experienced the greatest flooded area, with 432.3 acres of floodplain and 145.1 acres of low terrace inundated. The wet incised floodplain reach type encompasses the greatest overall area of the Lower Owens River, with approximately 2,927 acres. Conversely, the dry incised floodplain reach type (Reach 2) experienced the least flooded area of all reaches, with a total of 79.3 acres inundated under base flow conditions. Under base flow conditions, 1,028.3 acres of Lower Owens River landforms were inundated (Table 9).

Seasonal Habitat Flow Table 9. Extrapolation of Flooding Extent by Landform at Base Flow

Reach Type	Reach Numbers	Plot Numbers	Landform	Total Acres	Percent Inunidated	Acres Inundated
Dry Incised Floodplain	2	1 and 2	Floodplain	223.7	31.1%	69.6
			High terrace	925.6	1.0%	9.7
			Low terrace	99.0	0.0%	0.0
Wet Incised Floodplain	1, 3 and 5	3	Floodplain	519.7	83.2%	432.3
			High terrace	1241.9	0.5%	6.1
			Low terrace	1165.3	12.5%	145.1
Graded Wet Floodplain	6	4 and 5	Floodplain	303.3	46.1%	139.7
			High terrace	60.2	0.0%	0.0
			Low terrace	454.8	5.1%	23.3
Agraded Wet Floodplain	4	none	Floodplain	404.9	50.0%	202.5
			High terrace	169.6	0.0%	0.0
			Low terrace	590.7	0.0%	0.0
					Total	**1028.3**

During high flows, the flooded area per reach and landform increased considerably over base flow conditions. For example, in the graded wet floodplain reach type, over 65.1% (197.6 acres) of floodplain was inundated. Conversely, in the dry incised floodplain reach type only 48.1% (107.5 acres) of floodplain was flooded at high flow. Similar to base flow conditions, the dry incised floodplain reach type experienced the least flooded area, with only 134.8 acres inundated in the entire reach (Refer to Seasonal Habitat Flow Table 10.) The increase in high terrace inundation with no low terrace inundation is likely due to landform mapping errors, which would usually be encompassed in the low terrace but in this reach the floodplain is generally flanked by high terrace compared to low terrace in other reaches (WHA 2004).

The aggraded wet floodplain estimated percent inundation of 85% was based on analysis of video captured during the high flows as previously discussed. The total amount of landforms in this reach can be found overlaid on an aerial image of the area taken in August 2009 (Seasonal Habitat Flow Figure 11). This percentage inundation of the floodplain was further validated by comparisons with surrounding plots' change in inundation between 2008 and 2009. The floodplain in Plot 3 was found to increase from 83% to 92% in 2008 and had a similar increase (83.2 to 91.3%) in 2009. Plot 4 floodplain inundated extent increased by 12.1% during the high flow in 2008, from 76.9% to 89%. Plot 4 and had an even larger similar increase in 2009 of 15.5% (60.1% to 75.6%). Given this data it is likely that Reach 4 experienced a floodplain inundation of 85% or possibly higher considering the 2008 inundation was observed at 100%. The lack of quantitative data to evaluate flooded extent makes the inundation acreage estimated in this reach highly subjective.

For the entire Lower Owens River, approximately 478 additional acres were inundated as a result of the seasonal habitat flows. During the seasonal habitat flows, the floodplains and low terraces are the landforms that experienced the majority of inundation. About 77.4% of floodplains and 14.2% of low terraces in the Lower Owens River were inundated (Seasonal Habitat Flow Table 11). Most of the high terrace inundated occurred in the dry incised floodplain but some also occurred in the wet incised floodplain.

Seasonal Habitat Flow Table 10. Extrapolation of Flooded Extent by Landform at High Flow

Reach Type	Reach Numbers	Plot Numbers	Landform	Total Acres	Percent Inunidated	Acres Inundated
Dry Incised Floodplain	2	1 and 2	Floodplain	223.7	48.1%	107.5
			High terrace	925.6	3.0%	27.3
			Low terrace	99.0	0.0%	0.0
Wet Incised Floodplain	1, 3 and 5	3	Floodplain	519.7	91.3%	474.6
			High terrace	1241.9	2.1%	25.9
			Low terrace	1165.3	23.5%	274.0
Graded Wet Floodplain	6	4 and 5	Floodplain	303.3	65.1%	197.6
			High terrace	60.2	0.0%	0.0
			Low terrace	454.8	12.1%	54.9
Agraded Wet Floodplain	4	none	Floodplain	404.9	85.0%	344.2
			High terrace	169.6	0.0%	0.0
			Low terrace	590.7	0.0%	0.0
					Total	**1506.1**

Seasonal Habitat Flow Table 11. Landform Inundation Change and Percent Landform Flooding During High Flow

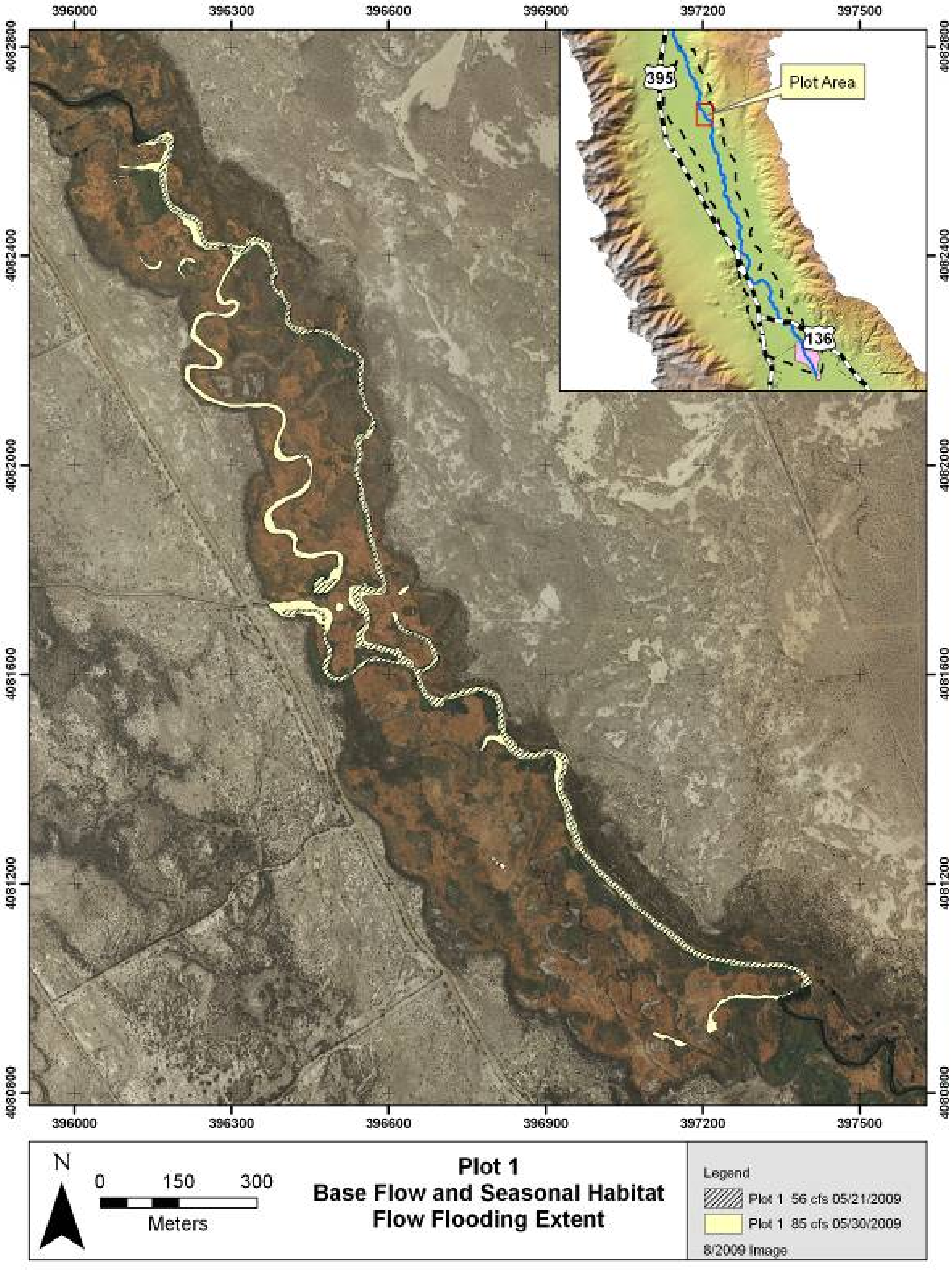
Landform	Total Acres	Base Flow Inundated Acres	High Flow Inundated Acres	Inundated Acreage Increase	% Landform inundated during seasonal habitat flow
Floodplain	1452	844.1	1123.9	279.8	77.42%
High Terrace	2397	15.8	53.2	37.4	2.22%
Low Terrace	2310	168.4	329.0	160.6	14.24%
Total	**6159**	**1028.3**	**1506.1**	**477.8**	

Woody Recruitment

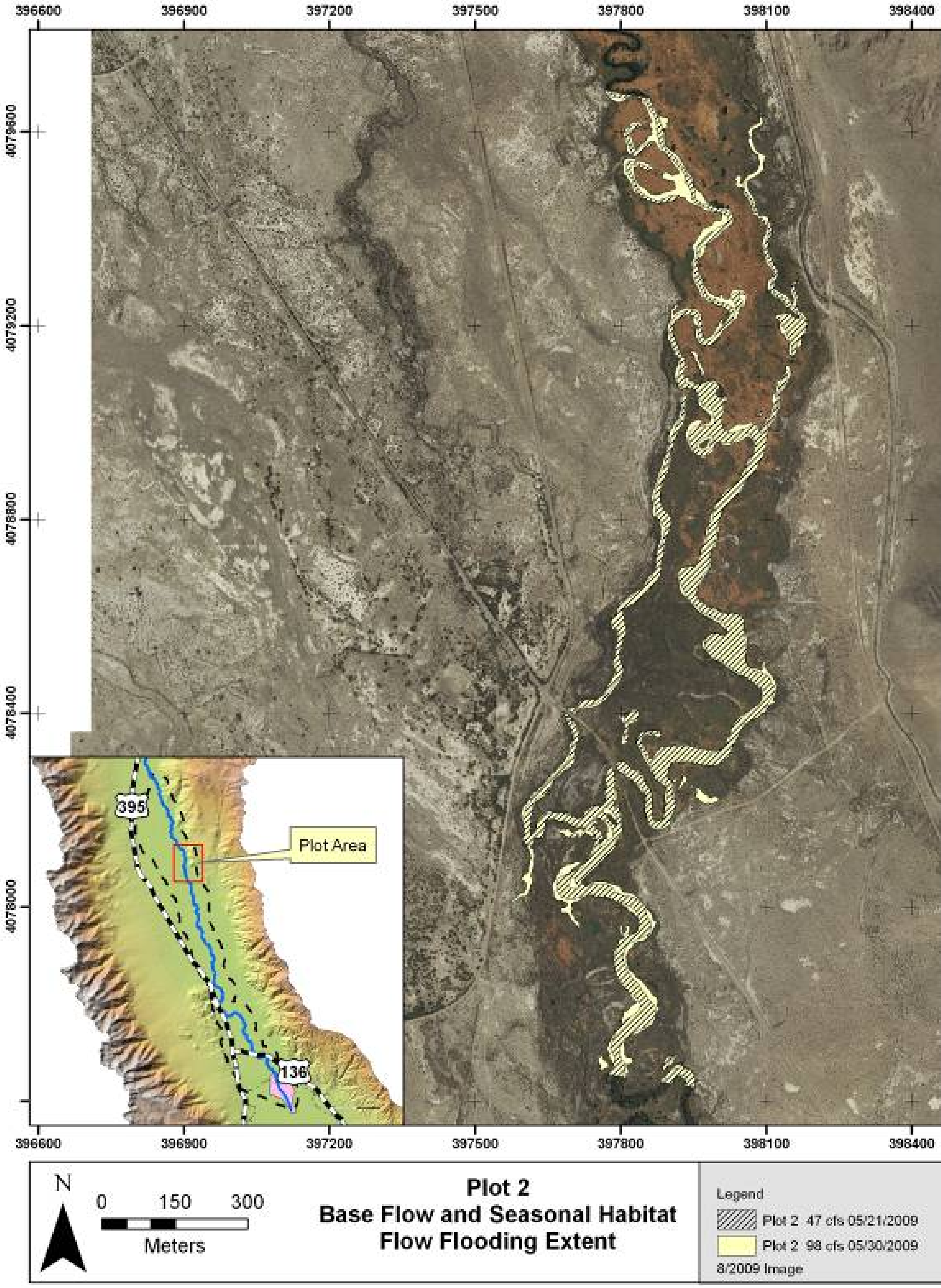
Areas marked with woody recruitment using Garmin etrex GPS units during the 2009 RAS survey (Section 4) were found in three of the five plots. These plots were located in the dry incised floodplain and wet incised floodplain. All areas noted for recruitment were within the seasonal flow flooded extent given the precision of the GPS units used to mark them. There were 66 areas within the LORP designated reaches with observed woody recruitment in 2009 that are summarized by reach type and landform in Seasonal Habitat Flow Table 12. These areas of recruitment were observed in August of 2009 therefore should represent germination due to the seasonal habitat flow of 2009. Over 51% of observed recruitment occurred in dry incised floodplain and 42 % occurred in the wet incised floodplain. These patterns are similar to what was observed in 2008 (Seasonal Habitat Flow Table 13). These gps locations, with abundance data, can be found in Section 4 Appendix A Map 12

Seasonal Habitat Flow Table 12. Woody Recruitment Observed in RAS by Reach Type in 2009

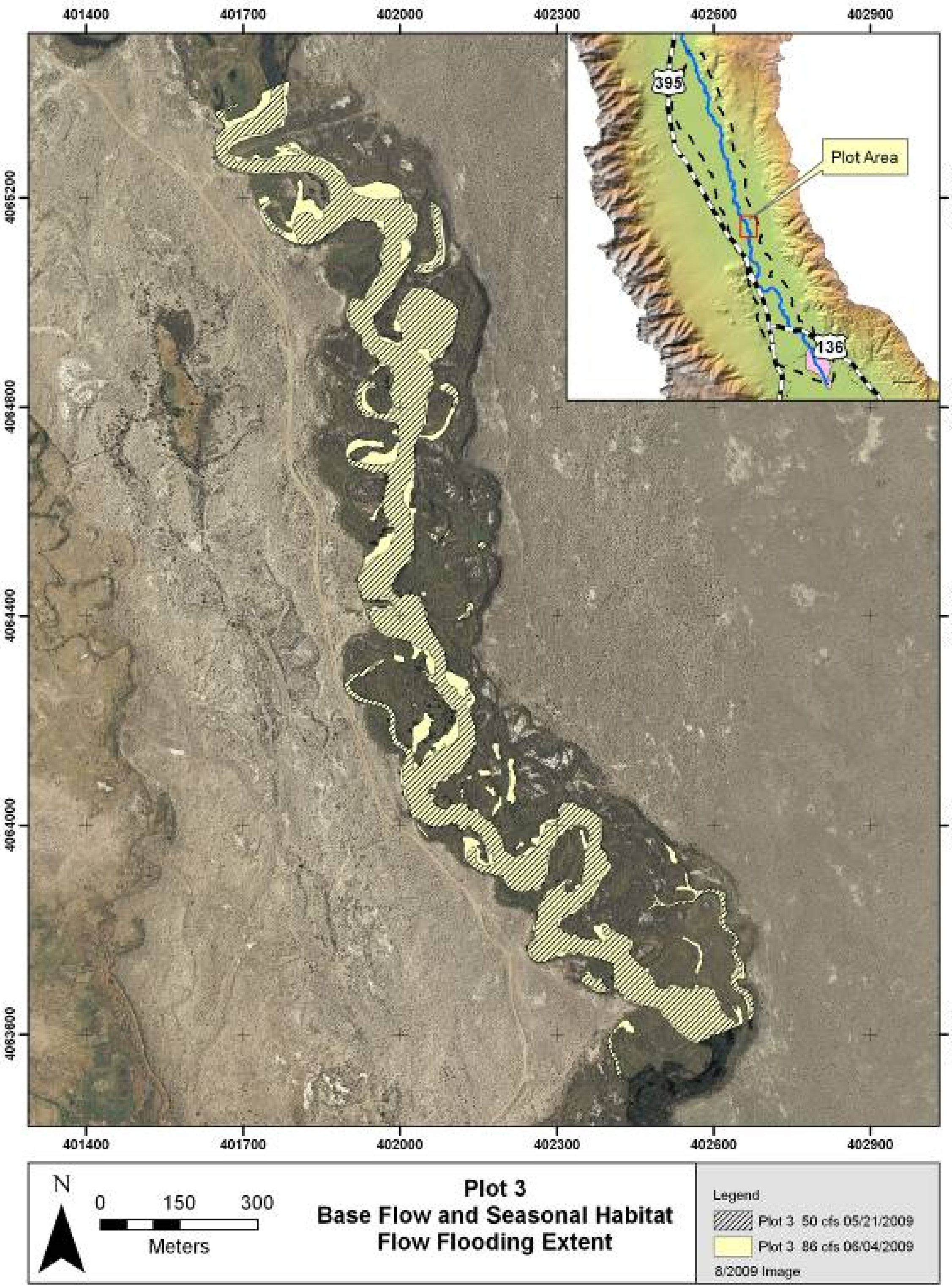
Reach Type	Landform	Number of locations	Percentage
Aggraded Wet Floodplain	Floodplain	1	1.5%
Graded Wet Floodplain	Floodplain	3	4.5%
Dry Incised Floodplain	Floodplain	17	
Dry Incised Floodplain	High Terrace	16	51.5%
Dry Incised Floodplain	Low Terrace	1	
Wet Incised Floodplain	Floodplain	16	
Wet Incised Floodplain	High Terrace	3	42.4%
Wet Incised Floodplain	Low Terrace	9	
	Total	66	



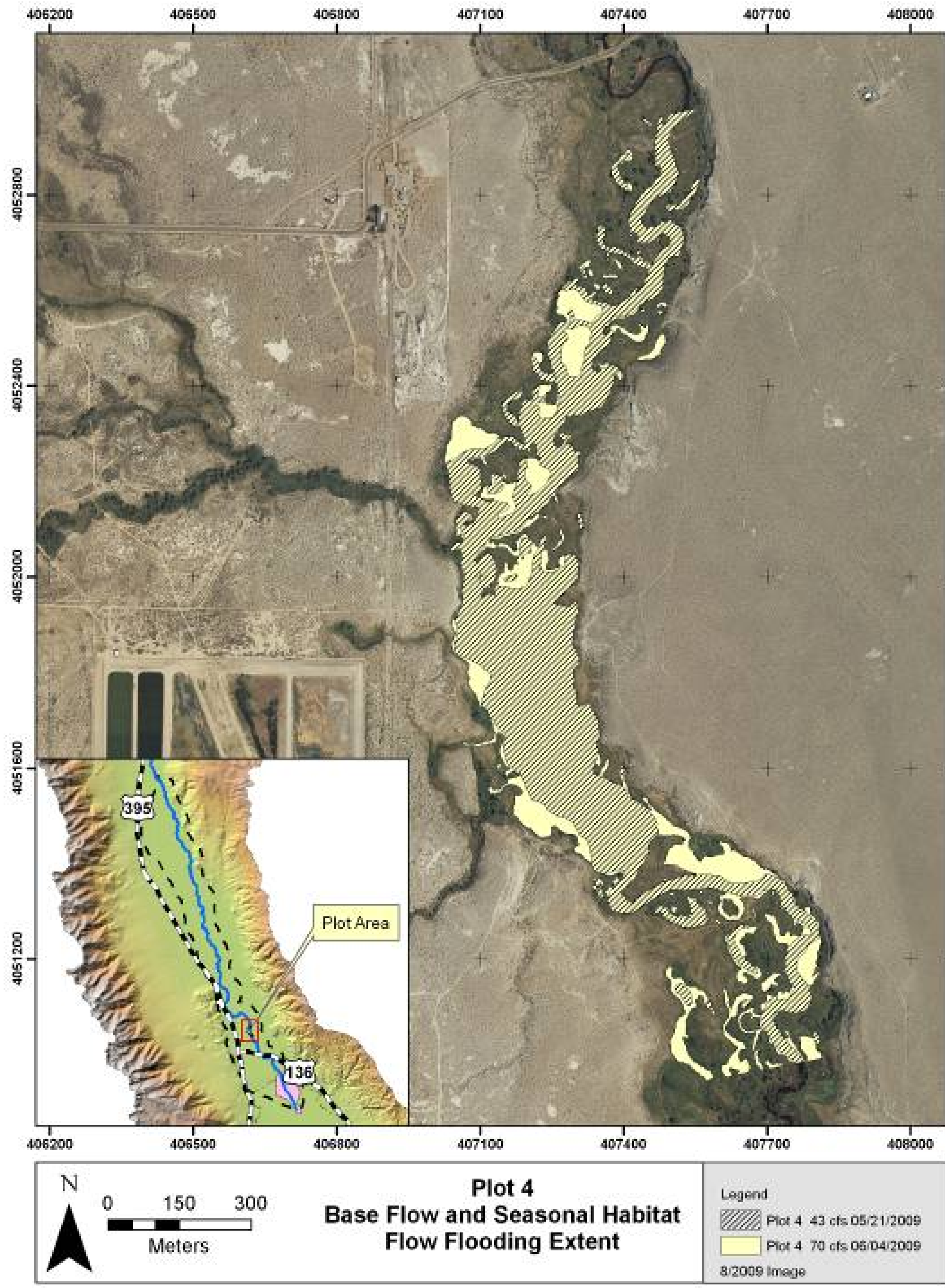
Seasonal Habitat Flow Figure 6. Plot 1 Flooding Extent



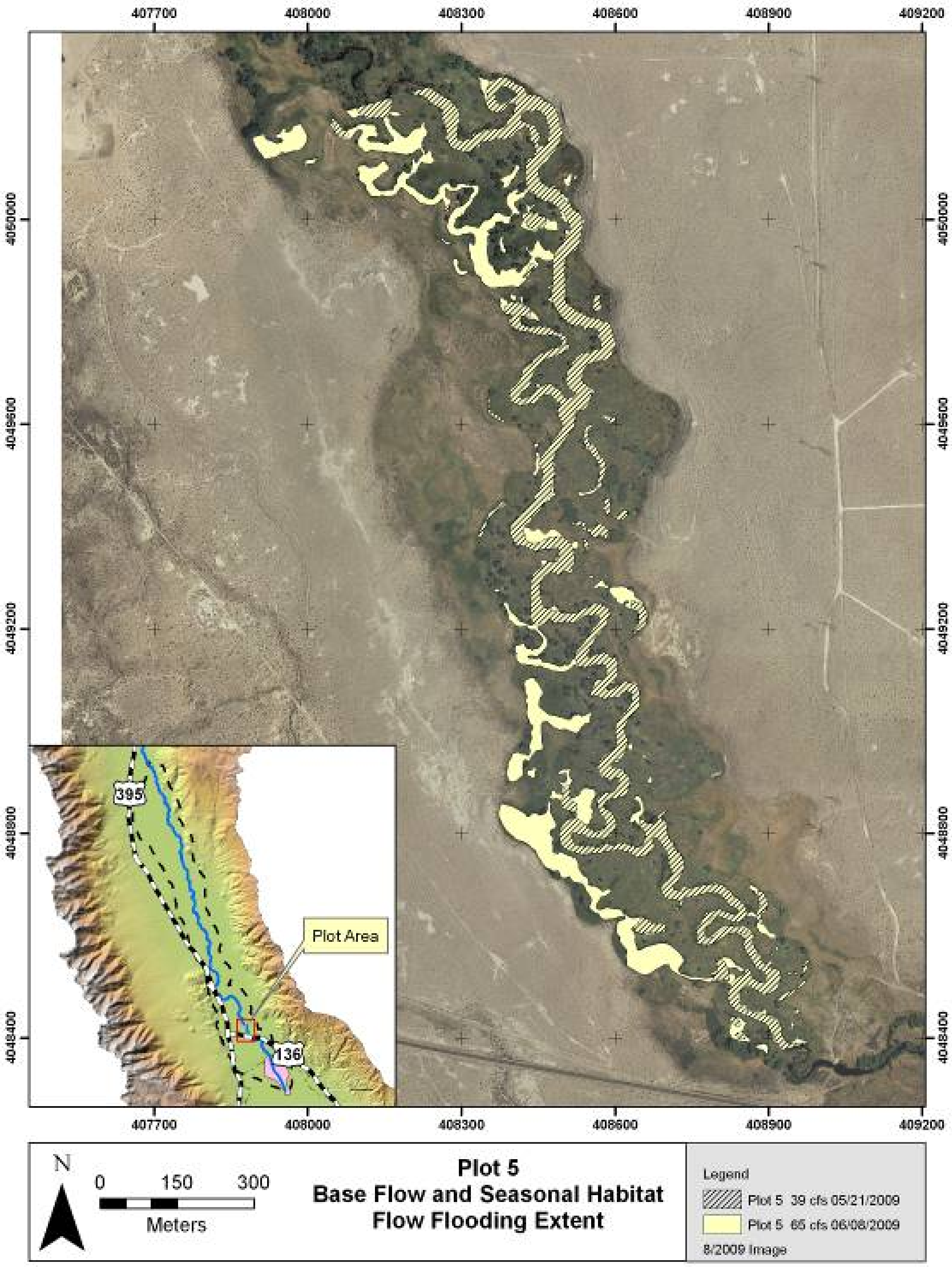
Seasonal Habitat Flow Figure 7. Plot 2 Flooding Extent



Seasonal Habitat Flow Figure 8. Plot 3 Flooding Extent



Seasonal Habitat Flow Figure 9. Plot 4 Flooding Extent



Seasonal Habitat Flow Figure 10. Plot 5 Flooding Extent

Seasonal Habitat Flow Figure 11. Landforms of the Aggraded Wet Floodplain Reach

2.11. Comparisons with 2008 Seasonal Habitat Flow

The 2008 seasonal habitat flow occurred early in the winter (flows were initiated February 13, 2008) and were ramped to 200 cfs compared to the 110 cfs peak flow of 2009. In 2008, 88% of the LORP floodplain was inundated compared to 77% in 2009. The largest difference in inundated extent between 2008 and 2009 was from the low terrace landform at 25% and 14%, respectively.

Even with the much lower flow of 2009, the dry incised floodplain reach experienced a similar flooded extent during high flows compared to 2008 (Seasonal Habitat Flow Table 12). Due to LORP flows, barren or sparse upland vegetation has been replaced by dense emergent vegetation along streambanks (Seasonal Habitat Flow Figure 12). This reach was virtually dry with little wetland vegetation before LORP flow initiation. This increase in riparian vegetation and plant cover causes an increase in water surface elevation so less flow will inundate more acreage. This is further evident as a similar baseflow produced a 22 acre increase in flooded extent in 2009 compared to 2008. This is particularly interesting given the higher temperatures and associated higher evapotranspiration rates during the spring season flow in 2009 compared to the winter release in 2008.

Seasonal Habitat Flow Figure 12. Example of Reach 2 (Dry Incised Floodplain) During Baseflow in 2007 (Left) and in 2009 (Right).

There was an increase of seven acres of inundated high terrace and a seven-acre decrease in floodplain inundated during seasonal habitat flows in the dry incised floodplain during 2009 seasonal habitat flows (Seasonal Habitat Flow Table 13). This is due to the same cause of vegetation colonizing the streambanks and growing, thereby changing the water surface elevation in dynamic ways. The dry incised floodplain reach has exhibited the most change in vegetation communities and will continue to be the most dynamic reach in the Lower Owens River as vegetation colonizes and matures.

The wet incised floodplain reach experienced similar inundation of the floodplain in both 2008 and 2009. Most of the decrease in flooded extent occurred in the low terrace landform with a total difference of 138.5 acres.

The graded wet floodplain reach experienced the greatest difference of flooded extent with 191.6 fewer acres inundated compared to 2008. This reach also experienced the lowest high flow, with a peak flow of 70 cfs and 65 cfs in Plot 4 and Plot 5, respectively. This reach is on the downstream side of Reach 4 where there is no defined channel which causes the peak flow to attenuate and spread throughout the large floodplain. This geography has caused the peak flow to lessen without the augmentation from Alabama Gates that occurred in 2008. This augmentation was required under the waste discharge permit for the LORP with the intention to flush organic material from the lower river and alleviate water quality concerns in 2008.

Baseflow inundated extent also decreased from 2008 to 2009 in the graded wet floodplain reach. Other reaches maintained or even increased inundated extent at baseflow even with slight decreases in baseflow. There are many possible factors contributing to this decrease. The most important is that baseflow during the mapping period in this reach decreased from 60 cfs in 2008 to 39 cfs in 2009. This reach also has the lowest amount of emergent vegetation to slow flow and increase water surface elevation. This reach also has the most elevation change in the lower Owens River (LORP FEIR) which may have allowed enough velocity to deepen the channel.

The augmentation from Alabama gates in 2008 inundated a large amount of low terrace of the agraded wet floodplain (Reach 4). This caused a large amount of standing water to persist and produced a large hatch of mosquitoes in proximity to the town of Lone Pine. This augmentation was not required in the Regional Water Quality Control Board waste dischage permit for 2009 and therefore did not occur. This operation did not produce the mosquito hatch that was seen in 2008.

Seasonal Habitat Flow Table 13. Comparison of Inundated Extent of the Seasonal Habitat Flow of 2008 and 2009

Reach Type	Landform	2009 Percent Inunidated	2009 Acres Inundated	2008 Percent Inunidated	2008 Acres Inundated	Difference Acres Inundated	Difference Acres Inundated (combined)
Dry Incised Floodplain	Floodplain	48.1%	107.5	51.2%	114.5	**-7.0**	**-0.1**
	High terrace	3.0%	27.3	2.2%	20.4	**6.9**	
	Low terrace	0.0%	0.0	0.0%	0.0	**0.0**	
Wet Incised Floodplain	Floodplain	91.3%	474.6	92.1%	478.6	**-4.0**	**-178.7**
	High terrace	2.1%	25.9	5.0%	62.1	**-36.2**	
	Low terrace	23.5%	274.0	35.4%	412.5	**-138.5**	
Graded Wet Floodplain	Floodplain	65.1%	197.6	92.2%	279.6	**-82.1**	**-191.6**
	High terrace	0.0%	0.0	1.3%	0.8	**-0.8**	
	Low terrace	12.1%	54.9	36.0%	163.7	**-108.8**	
Agraded Wet Floodplain	Floodplain	85.0%	344.2	100.0%	404.9	**-60.7**	**-60.7**
	High terrace	0.0%	0.0	0.0%	0.0	**0.0**	
	Low terrace	0.0%	0.0	0.0%	0.0	**0.0**	
		Totals	**1506.1**		**1937.2**	**-431.1**	

<u>Acreage Increase above Baseflow</u>

In terms of available area for the recruitment of woody riparian vegetation, a more appropriate way to look at the seasonal habitat flow inundation is the difference between the baseflow acreage inundated and the highflow acreage inundated each year. The difference is the acreage where woody riparian species are most likely to germinate and grow due to the seasonal habitat flow in that year. This is important given the decrease in baseflow flooded extent in the graded wet floodplain and the increase in the dry incised floodplain reach.

There was an increase of approximately 703.6 flooded acres over baseflow in 2008 compared to an increase of 478 acres in 2009 (Seasonal Habitat Flow Table 14).

The dry incised floodplain reach experienced about 22 acres less of flooded acres in 2009 compared to 2008, which is the smallest difference between the two years of seasonal habitat flow.

The wet incised floodplain experinced the greatest difference in floodplain inundation between the two years, with 111.5 more acres inundated in 2008 by the seasonal habitat flow.

In the graded wet floodplain, there was a small increase in increased floodplain acres inundated and a decrease in the low terrace acreage inundated (Seasonal Habitat Flow Table 14) over baseflow in 2009 when compared to 2008. This resulted in only 31.5 less acres inundated in 2009 even when the difference in total acres inundated extent was 191.6 acres (Seasonal Habitat Flow Table 13).

Seasonal Habitat Flow Table 14. Comparison of Increase in Area Inundated in 2008 and 2009

Reach Type	Landform	2009 Highflow-Baseflow Inundated Acreage Increase	2008 Highflow-Baseflow Inundated Acreage Increase	Difference in Acreage Inundated 2008 - 2009
Dry Incised Floodplain	Floodplain	37.9	65.5	-27.6
	High terrace	17.6	12.0	5.6
	Low terrace	0.0	0.0	0.0
	Total	**55.5**	**77.6**	**-22.1**
Wet Incised Floodplain	Floodplain	42.3	45.2	-2.9
	High terrace	19.8	53.4	-33.6
	Low terrace	128.9	203.9	-75.0
	Total	**191.0**	**302.5**	**-111.5**
Graded Wet Floodplain	Floodplain	57.9	57.0	0.8
	High terrace	0.0	0.8	-0.8
	Low terrace	31.7	63.2	-31.5
	Total	**89.5**	**121.0**	**-31.5**
Agraded Wet Floodplain	Floodplain	141.7	202.5	-60.7
	High terrace	0.0	0.0	0.0
	Low terrace	0.0	0.0	0.0
	Total	**141.7**	**202.5**	**-60.7**
All Reaches	**Total**	**477.8**	**703.6**	**-225.8**

Woody Riparian Recruitment Comparison

The dry incised floodplain and wet incised floodplain are the two reaches that have seen significant recruitment of woody riparian species such as willow (*Salix* spp.) and Fremont cottonwood in both years (Seasonal Habitat Flow Table 15). The aggraded wet floodplain and graded wet floodplain had a small proportion of the total recruitment observed in both years. The aggraded wet floodplain and graded wet floodplain reaches already have a large proportion of riparian vegetation (see Seasonal Habitat Flow Table 8) and will not likely be able to recruit more early successional woody species without disturbance causing bare ground, regardless of the seasonal habitat flow. These reaches also experienced an average 4-5 cfs flow before the Lower Owens River project which has provided for wetland and riparian vegetation growth before the project was implemented, which again leaves little area for new recruitment.

Seasonal Habitat Flow Table 15. Comparison of Woody Recruitment Percentage Observed in RAS by Reach Type in 2009 and 2008

Reach Type	2009 Percentage of Woody Recruitment Locations	2008 Percentage of Woody Recruitment Locations
Aggraded Wet Floodplain	1.5%	8.9%
Graded Wet Floodplain	4.5%	3.9%
Dry Incised Floodplain	51.5%	35.2%
Wet Incised Floodplain	42.4%	52.0%

2.12. Overall Findings and Conclusions

The 2009 seasonal habitat flow was timed to occur with seasonal runoff and seed release of woody riparian vegetation; the latter of which is an objective of the flow release pertinent to the MOU. Due to variable environmental conditions timing of flow release can be difficult. This year unexpectedly cool weather caused the timing of peak flows to miss peak willow and cottonwood seed production. Future seasonal habitat flows will continue to be initiated to correspond with the projected peak seed fly of woody riparian vegetation. The following is a summary of the overall findings and conclusions from the 2009 seasonal habitat flow:

- Flooding was estimated to cover approximately 1,506 acres within the Lower Owens River.
- There was an increase of 477.8 acres inundated above base flow conditions that provided areas for recruitment woody riparian species.
- During the seasonal habitat flows about 77.4% of floodplains and 14.2% of low terraces in the Lower Owens River were inundated.
- Even with the low seasonal habitat flow of 2009 woody riparian species are germinating in inundated areas.
- Three of the four monitoring stations (Manzanar Reward Road, Reinhackle Spring Station, and Keeler Bridge) experienced moderate drops in dissolved oxygen levels. No water quality thresholds were reached and no fish kills were observed.
- The time for the peak 110 cfs flow to move down the Lower Owens River was 12 days 19 hours from the LAA Intake to the Pumpback Station. Based on previous studies, that indicates the velocities averaged well below one-foot per-second during the flushing flows.

- In general, hydro measuring stations performed well and actions were taken to compensate for anticipated sediment problems at some stations.
- Aerial videos combined with ground level surveys provided effective tools to measure flooded extent.
- Channel losses and flow changes are accurately displayed in Seasonal Habitat Flow Figures 6-10. The illustrations display 24 days of river flow data from May 24 through June 16, 2009 (base flow to high-flow and return to base flow).

2.12.1. Recommendations for Future Helicopter Monitoring

The geo-referenced digital video acquired using LADWP's helicopter is an excellent method for monitoring the seasonal habitat flow. The resolution of the video was sufficient to identify inundated areas and detect change based on increasing flow. It is recommended that future seasonal habitat flows be monitored in a similar fashion. The helicopter should try to maintain similar fight paths to facilitate comparisons between monitoring events. Digital still photos should also be taken from as vertical an orientation as possible to facilitate alignment with existing imagery. These photos should be taken flying from south to north as this allows orientation of the still photos in geographic space easier and offers the best lighting for reduced glare.

Below is a suggested flight schedule based on the peak flow of 110 cfs release in 2009. Peak flow arrival will vary depending on the peak flow released. A higher flow will result in high velocity and therefore a decrease in the arrival time at each measuring station.

1. Entire River. Two weeks prior to seasonal habitat flow release. This flight will serve to document base flow conditions.

2. Reaches 1 and 2. Two days after peak high flow release from intake. In 2009 high flows occurred in Reach 2 roughly 53 hours after the peak high flow release.

3. Reaches 3 and 4. Seven days after peak high flow release from intake. In 2009 high flows reached the Reinhackle monitoring station seven days and 12 hours after the peak high flow release.

4. Reaches 5 and 6. Eleven days after peak high flow release from intake. In 2009 high flows reached Lone Pine at Narrow Gage Road measuring station approximately 11 days after the peak high flow release.

5. Entire River. Two weeks after base flows return to normal. This flight will document immediate changes to the river due to the seasonal habitat flow.

2.13. References

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2.14. Seasonal Habitat Flow Appendices

2.14.1. Appendix 2A: Inyo County Water Quality Data

Manual Water Quality Data

Gaps in data are due to the following causes: (1.) No data taken. (2.) Data eliminated due to quality assurance-quality control issues.

LOWER OWENS RIVER WATER QUALITY DATA-TAKEN MANUALLY BY QUANTA OR TEST KIT	
SPRING, 2009 HABITAT FLOW	
Equipment Programmed, Calibrated and Operated by R. Jackson, Senior County Hydrologist	Initial Quality Control Check by Randy Jackson, Senior County Hydrologist.
DATA LEGEND	
nd- no data taken tr-trace 0.0-measurement made, none detected *QC-Quality Control Note with and explantion of why the data has a problem in comments D.O.-Dissolved Oxygen, mg/l - Hyrolab Quanta Turbidity-NTU units-Hydrolab Quanta pH-pH units-Hydrolab Quanta E.C. - Electrical Conductivity in milliseimens per cm-Hyrolab Quanta. Temperature- In Degrees C-Hydrolab Quanta Ammonia-mg/l as Ammonia Nitrogen-Hach Test Kit Hydrogen Sulfide-mg/l as Hydrogen Sulfide-Hach Test Kit Tannins and Lignins-mg/l tannic acid-Hach Test Kit	
Measurements taken by Randy Jackson, Senior County Hydrologist. Jeff Nordin of LADWP was the available backup sampler.	
All manual turbidity data taken by Quanta is no good. Quanta failed to calibrate in turbidity and read extremely high. See continuous recorder data where available for Turbidity.	
Quanta failed on several occassions, with water in the transmitter.	

Mazourka Canyon Road-River Mile 22.91 from Intake (Approximate elevation 3732) Slope 2.49 feet per mile											
Date	Time	Q	D.O.	Turbidity	pH	E.C.	Temp	Ammonia	Hydrogen Sulfide	Tannins Lignins	Comments
5/22/2009	12:46		4.44	39.1	7.66	0.336	19.13	0.0	0.0	0.2	Tubidity data is no good, Quanta Turbidity will not calibrate and reads high.
5/26/2009	8:33		4.33	10.2	7.73	0.319	19.25	0.0	0.0	0.0	Clear warm weather. Turbidity data is no good, Quanta Turbidity will not calibrate and reads high.
5/27/2009	11:50		4.56	59.4	7.86	0.309	19.72	0.0	0.0	0.0	Turbidity data is no good, Quanta Turbidity will not calibrate and reads high.
5/28/2009	12:14		4.26	40.0	7.79	0.339	19.69	0.0	0.0	0.4	Clear water, warm cloudy weather. Tubidity data is no good, Quanta Turbidity will not calibrate and reads high.
5/29/2009	13:56		4.05	nd	7.62	0.357	19.49	nd	nd	nd	Clear water.
6/1/2009	8:24		3.64	nd	7.64	0.321	18.57	0.0	0.0	0.4	High clouds, warm, clear water.
6/2/2009	8:35		4.13	nd	7.69	0.324	18.06	0.0	0.0	0.5	Clear cool weather, clear water.
6/3/2009	8:18		4.30	nd	7.64	0.328	18.10	nd	nd	nd	Cloudy and cool, clear water.
6/4/2009	8:22		4.54	nd	7.40	0.335	15.56	0.0	0.0	0.2	Sunny, cool, clear water.
6/5/2009	8:27		5.30	nd	7.90	0.338	15.85	nd	nd	nd	Cloudy cool, windy, clear water.
6/8/2009	10:46		nd	nd	nd	nd	nd	nd	nd	nd	Clear water, quanta quit working.
6/12/2009	8:56		5.20	nd	7.77	0.354	18.35	nd	nd	nd	Clear water.
6/17/2009	9:38		5.30	nd	nd	nd	nd	nd	nd	nd	Clear water, quanta failed except d.o.

Manzanar Reward Road Mile 32.27 from Intake (Approximately 3700) Slope 7.21 feet per mile											
Date	**Time**	**Q**	**D.O.**	**Turbidity**	**pH**	**E.C.**	**Temp**	**Ammonia**	**Hydrogen Sulfide**	**Tannins Lignins**	**Comments**
5/22/2009	**12:06**		**3.91**	**39.4**	**7.55**	**0.394**	**19.01**	**0.0**	**0.0**	**0.8**	**Turbidity data is no good, Quanta Turbidity will not claibrate and reads high.**
5/26/2009	**8:56**		**4.64**	**37.4**	**7.60**	**0.340**	**18.33**	**0.0**	**0.0**	**2.4**	**Turbidity data is no good, Quanta Turbidity will not claibrate and reads high.**
5/27/2009	**11:22**		**4.15**	**53.2**	**7.79**	**0.328**	**19.25**	**0.0**	**0.0**	**1.0**	**Turbidity data is no good, Quanta Turbidity will not claibrate and reads high.**
5/28/2009	**13:08**		**3.98**	**32.3**	**7.65**	**0.325**	**19.28**	**0.0**	**0.0**	**0.2**	**Turbidity data is no good, Quanta Turbidity will not claibrate and reads high.**
5/29/2009	**13:43**		**4.11**	**nd**	**7.61**	**0.329**	**19.90**	**nd**	**nd**	**nd**	**Clear water.**
6/1/2009	**8:46**		**3.12**	**nd**	**7.73**	**0.489**	**18.82**	**0.0**	**0.0**	**2.8**	**Water slight tea color.**
6/2/2009	**9:24**		**2.85**	**nd**	**7.74**	**0.500**	**18.79**	**0.0**	**0.0**	**4.6**	**Water slight tea color.**
6/3/2009	**8:31**		**2.60**	**nd**	**7.61**	**0.426**	**18.10**	**0.0**	**0.0**	**2.4**	**Water slight tea color.**
6/4/2009	**8:41**		**2.60**	**nd**	**7.41**	**0.403**	**15.98**	**0.0**	**0.0**	**1.2**	**Water slight tea color.**
6/5/2009	**8:45**		**3.52**	**nd**	**7.84**	**0.387**	**16.06**	**0.0**	**0.0**	**2.8**	**6 large mouth bass and one carp were caught when I was there on night crawlers, water slight tea color.**
6/8/2009	**10:27**		**nd**	**nd**	**nd**	**nd**	**nd**	**nd**	**nd**	**nd**	**Clear water, see hydrolab sonde data.**
6/9/2009	**8:51**		**nd**	**nd**	**nd**	**nd**	**nd**	**nd**	**nd**	**nd**	**Removed data sonde and installed at Reinhackle, see hydrolab sonde data.**
6/12/2009	**9:09**		**4.43**	**nd**	**7.52**	**0.374**	**18.07**	**nd**	**nd**	**nd**	**Frogs, clear water.**
6/17/2009	**9:58**		**4.32**	**nd**	**nd**	**nd**	**nd**	**nd**	**nd**	**nd**	**Quanta failed except d.o, Bass.**

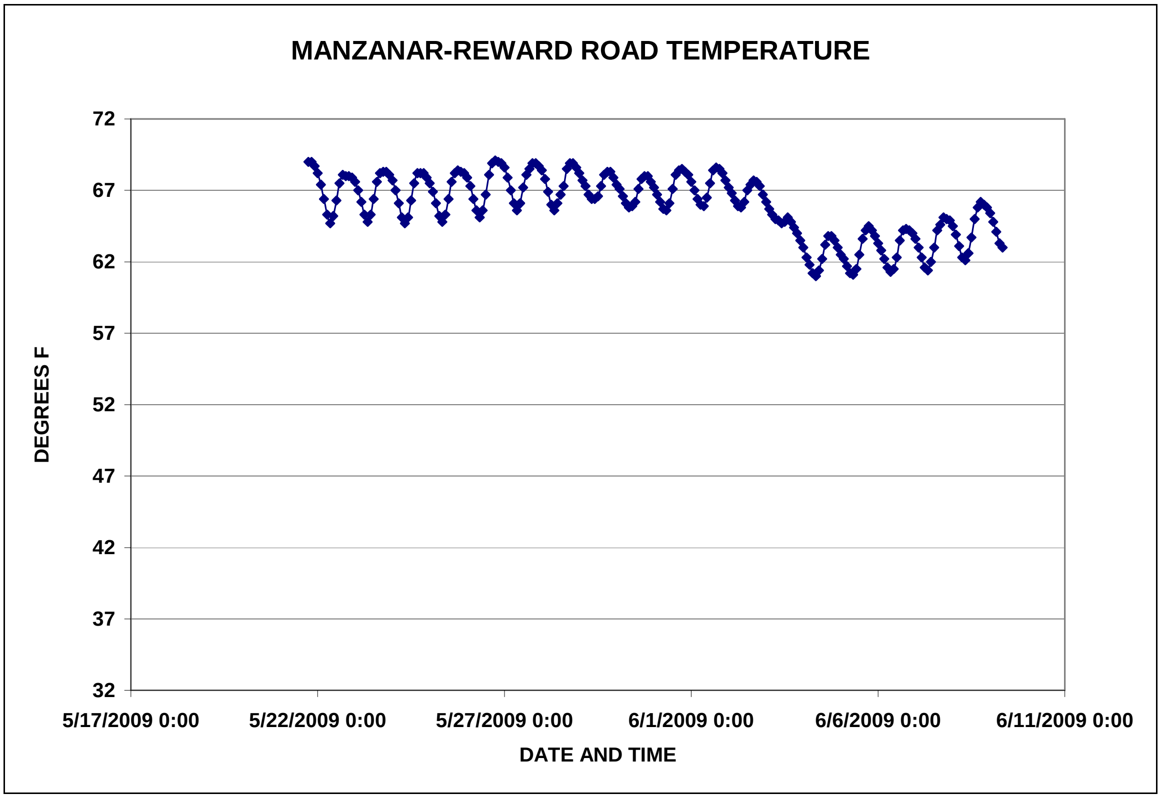
Reinhackle Springs - Mile 38.26 from Intake (Approximately 3667) Slope 3.89 feet per mile											
Date	Time	Q	D.O.	Turbidity	pH	E.C.	Temp	Ammonia	Hydrogen Sulfide	Tannins Lignins	Comments
5/22/2009	11:46		3.84	31.1	7.54	0.407	18.59	0.0	0.0	1.4	Gambosia. Turbidity data is no good, Quanta Turbidity will not calibrate and reads high.
5/26/2009	9:27		4.12	30.9	7.67	0.359	18.08	0.0	0.0	1.8	Turbidity data is no good, Quanta Turbidity will not calibrate and reads high.
5/27/2009	10:55		4.00	41.7	7.80	0.353	18.96	0.0	0.0	1.5	Turbidity data is no good, Quanta Turbidity will not claibrate and reads high. Great Blue Herron.
5/28/2009	13:42		4.47	84.8	7.69	0.340	19.22	0.0	0.0	1.6	Turbidity data is no good, Quanta Turbidity will not calibrate and reads high.
5/29/2009	13:22		4.11	nd	7.71	0.328	19.06	nd	nd	nd	Clear water.
6/1/2009	9:17		3.64	nd	7.65	0.349	18.17	0.0	0.0	1.4	Clear water.
6/2/2009	9:50		3.16	nd	7.76	0.409	18.22	0.0	0.0	2.2	Clear water, gambosia.
6/3/2009	8:57		3.4	nd	7.31	0.526	17.76	nd	nd	nd	Water slight tea color, raining.
6/4/2009	9:09		2.47	nd	7.48	0.508	15.89	0.0	0.0	2.0	Tea colored water.
6/5/2009	9:18		2.95	nd	7.83	0.441	16.18	0.0	0.0	2.4	Slight tea colored water.
6/8/2009	9:59		4.15	nd	7.35	0.373	16.99	0.0	0.0	1.4	Clear water, gambosia.
6/9/2009	9:09		3.94	4.8	7.76	0.362	17.22	nd	nd	nd	Gambosia.
6/12/2009	9:26		4.49	nd	7.69	0.36	17.39	nd	nd	nd	Clear water, gambosia.
6/17/2009	10:26		4.73	nd	nd	nd	nd	nd	nd	nd	Clear water, quanta failed except d.o., Great blue herron.

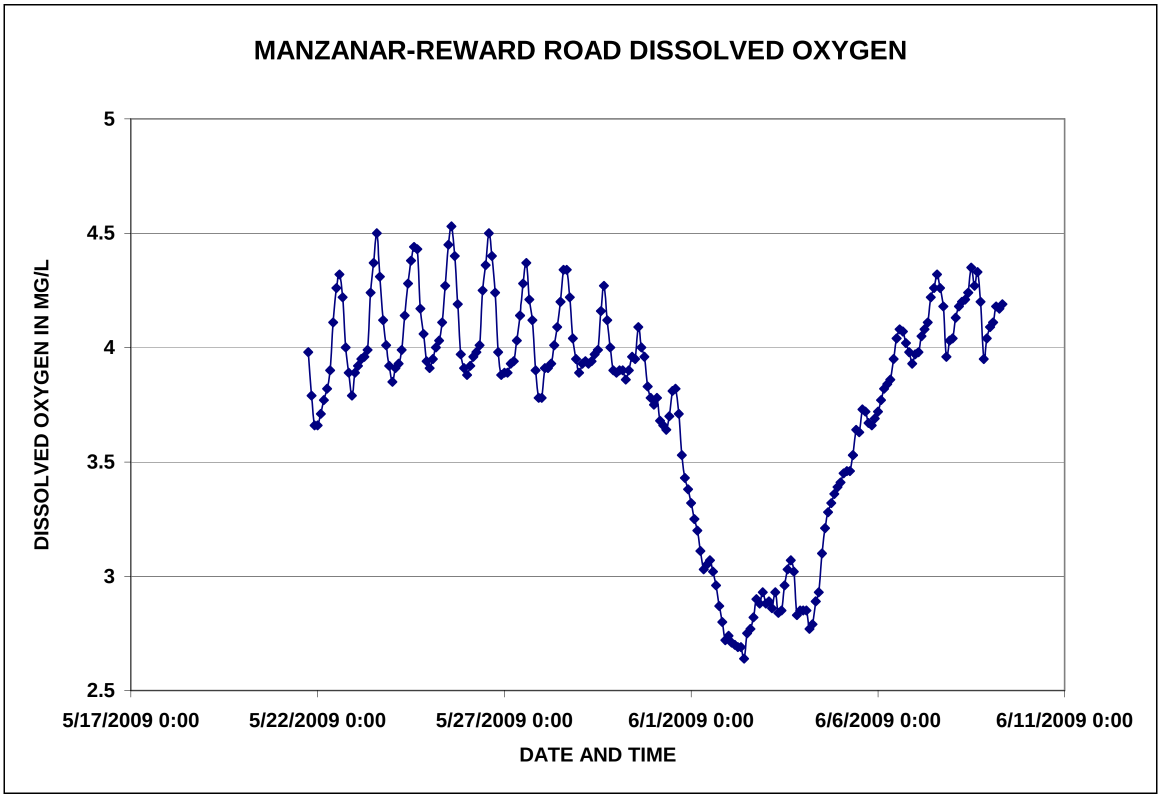
Keeler Bridge-Mile 55.72 from Intake (Approximately 3594) Slope 2.28 feet per mile											
Date	Time	Q	D.O.	Turbidity	pH	E.C.	Temp	Ammonia	Hydrogen Sulfide	Tannins Lignins	Comments
5/22/2009	10:32		4.40	19.2	7.57	0.502	18.35	0.0	0.0	2.8	Sunny, warm, 2% clouds, gambosia, Turbidity data no good, as above.
5/26/2009	10:08		5.18	36.1	8.04	0.478	17.91	0.0	0.0	2.8	Turbidity data no good, as above.
5/27/2009	10:18		4.81	56.8	7.87	0.462	18.31	0.0	0.0	2.2	Cloudy, warm, Turbidity data no good, as above.
5/28/2009	12:14		5.11	62.3	8.06	0.448	19.98	0.0	0.0	1.2	Turbidity data no good, as above.
5/29/2009	12:41		4.82	nd	7.89	0.438	19.04	nd	nd	nd	Cloudy, warm, clear water.
6/1/2009	9:50		4.94	nd	7.84	0.41	17.79	0.0	0.0	1.2	Clear water.
6/2/2009	10:18		5.05	nd	7.92	0.402	17.99	0.0	0.0	2.2	Clear water.
6/3/2009	9:30		5.2	nd	7.97	0.393	16.98	nd	nd	nd	Slight tea colored water, crayfish.
6/4/2009	9:43		4.42	nd	7.65	0.404	15.28	0	0	1.8	Slight tea colored water, crayfish.
6/5/2009	9:58		4.95	nd	8.04	0.407	15.54	nd	nd	nd	Slight tea colored water, crayfish and gambosia.
6/8/2009	9:20		4.34	nd	7.79	0.585	17.16	0	0	3.8	Cloudy warm, slight tea colored water, gambosia.
6/9/2009	10:00		nd	0.0	7.65	0.548	15.05	nd	nd	nd	Gambosia.
6/12/2009	9:49		5.45	nd	8.33	0.472	17.97	nd	nd	nd	Clear water, gambosia.
6/17/2009	11:04		nd	nd	nd	nd	nd	nd	nd	nd	Quanta completely failed.

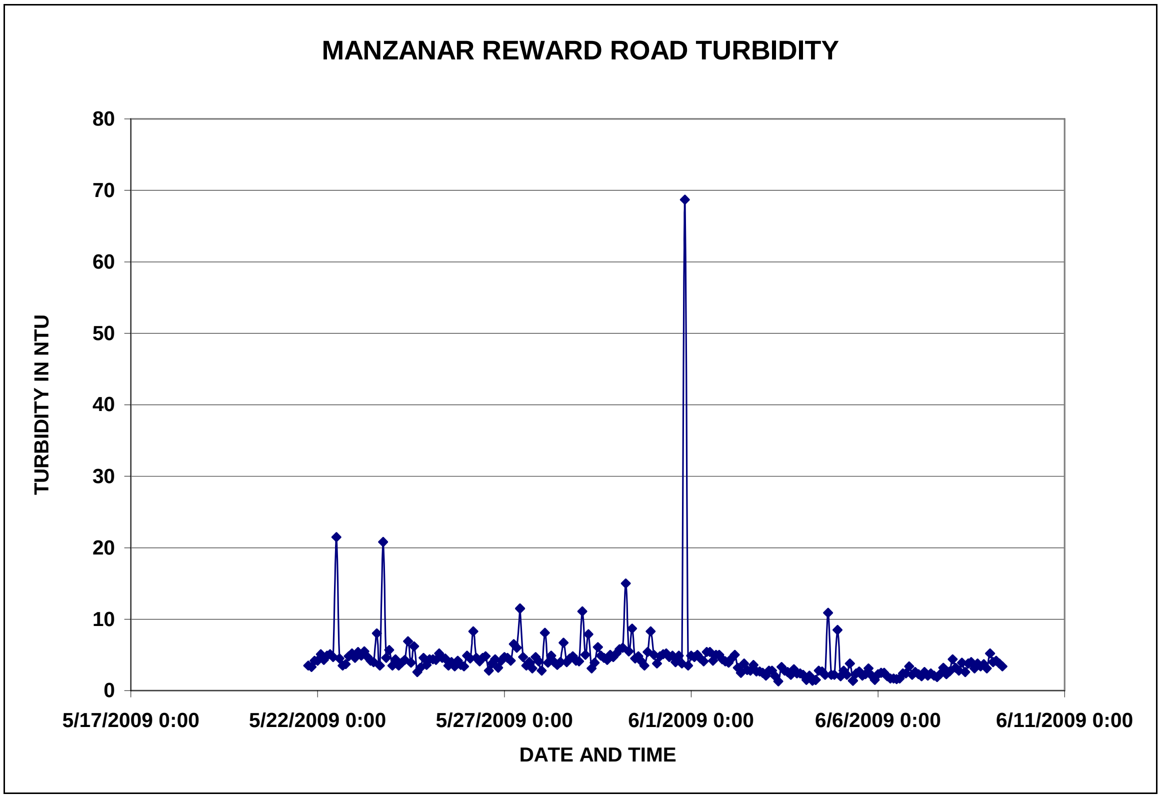
2.14.2. Appendix 2B Continuous Water Quality Data

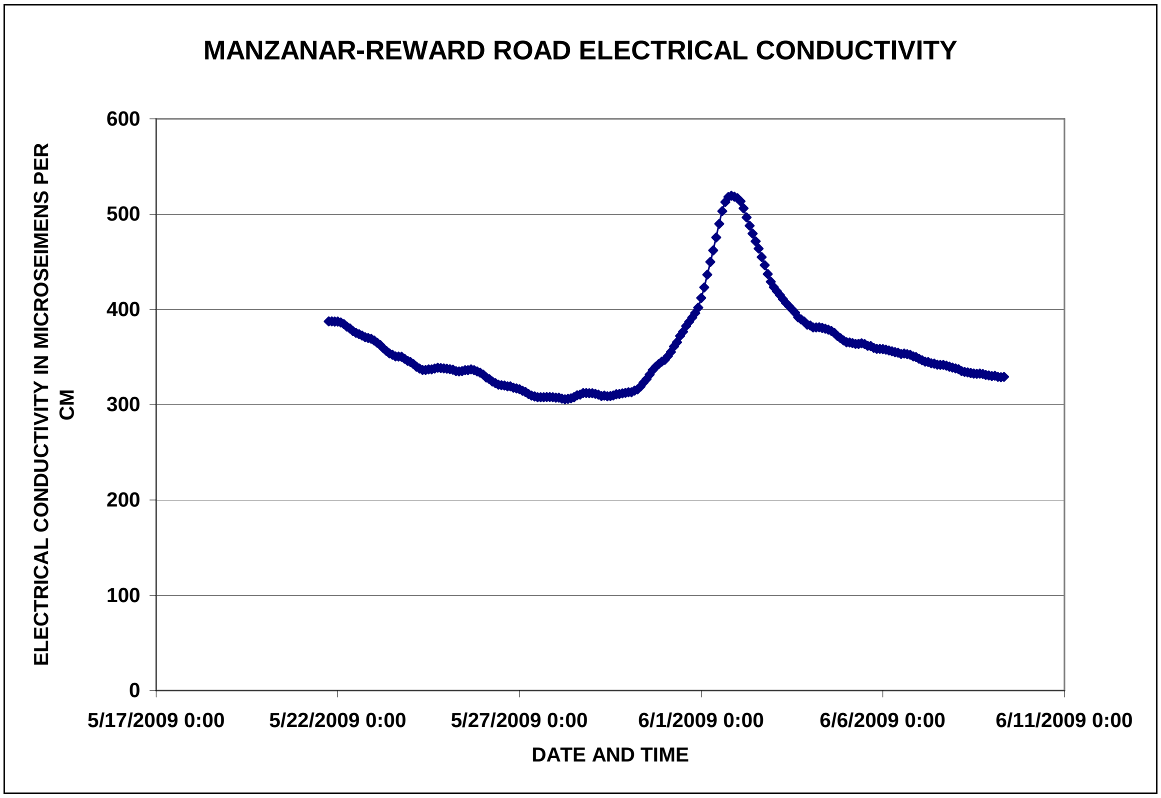
Gaps in data are due to the following causes: (1.) No data taken. (2.) Data eliminated due to quality assurance-quality control issues.

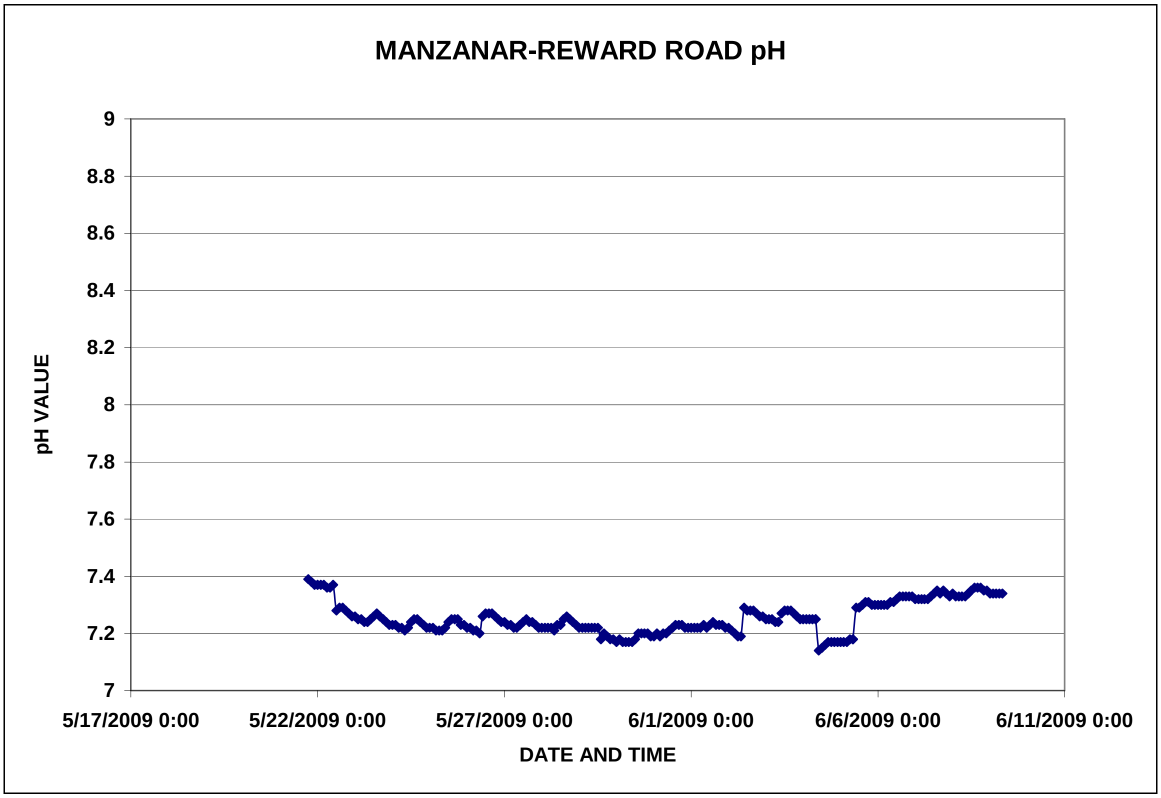
Manzanar Reward Road



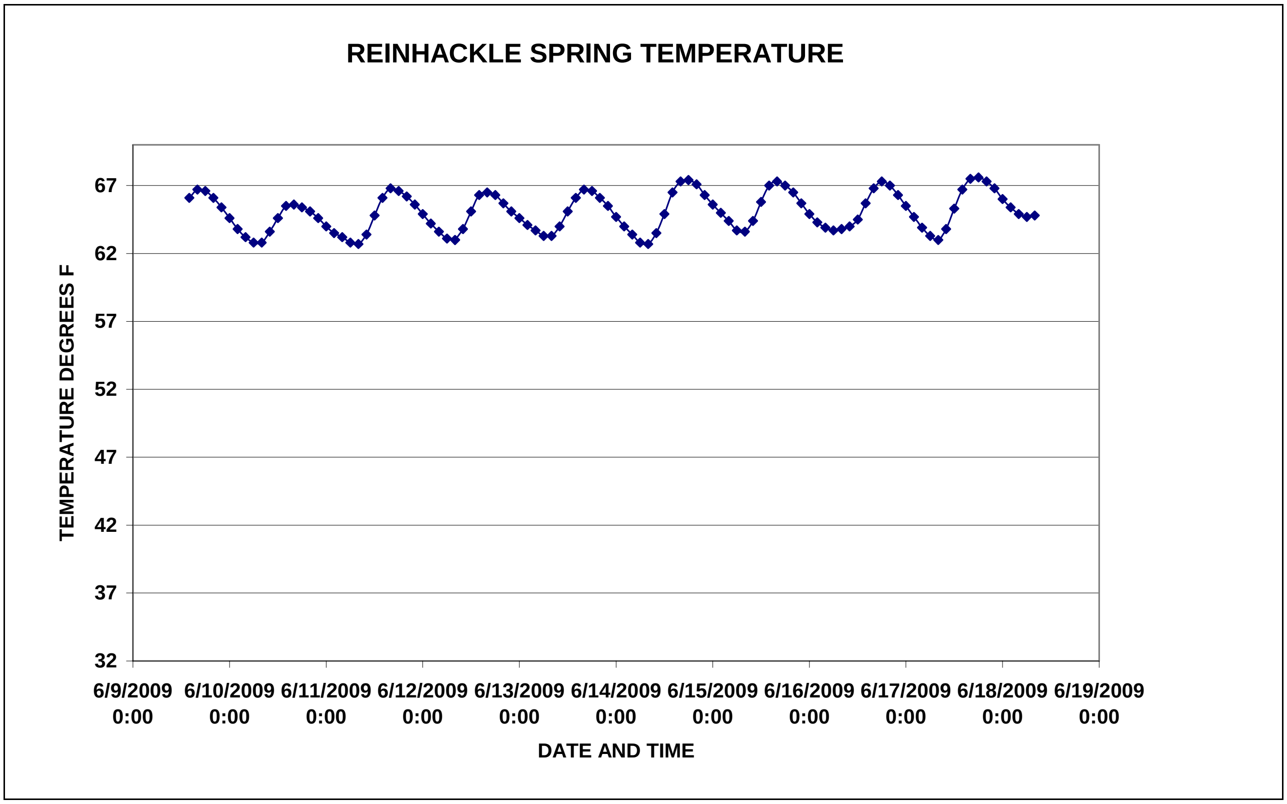

MANZANAR-REWARD ROAD DISSOLVED OXYGEN
DISSOLVED OXYGEN IN MG/L
5
4.5
4
3.5
3
2.5
5/17/2009 0:00
5/22/2009 0:00
5/27/2009 0:00
6/1/2009 0:00
6/6/2009 0:00
6/11/2009 0:00
DATE AND TIME

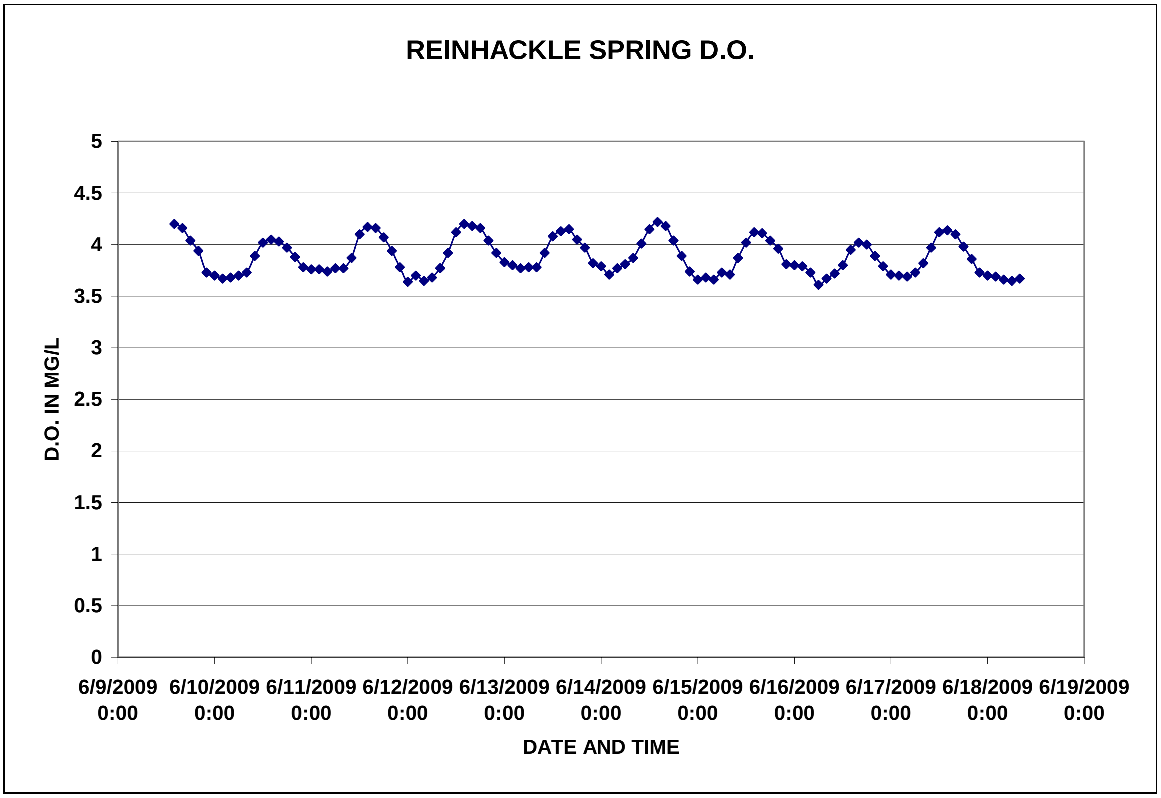

MANZANAR REWARD ROAD TURBIDITY
TURBIDITY IN NTU
80
70
60
50
40
30
20
10
0
5/17/2009 0:00
5/22/2009 0:00
5/27/2009 0:00
6/1/2009 0:00
6/6/2009 0:00
6/11/2009 0:00
DATE AND TIME

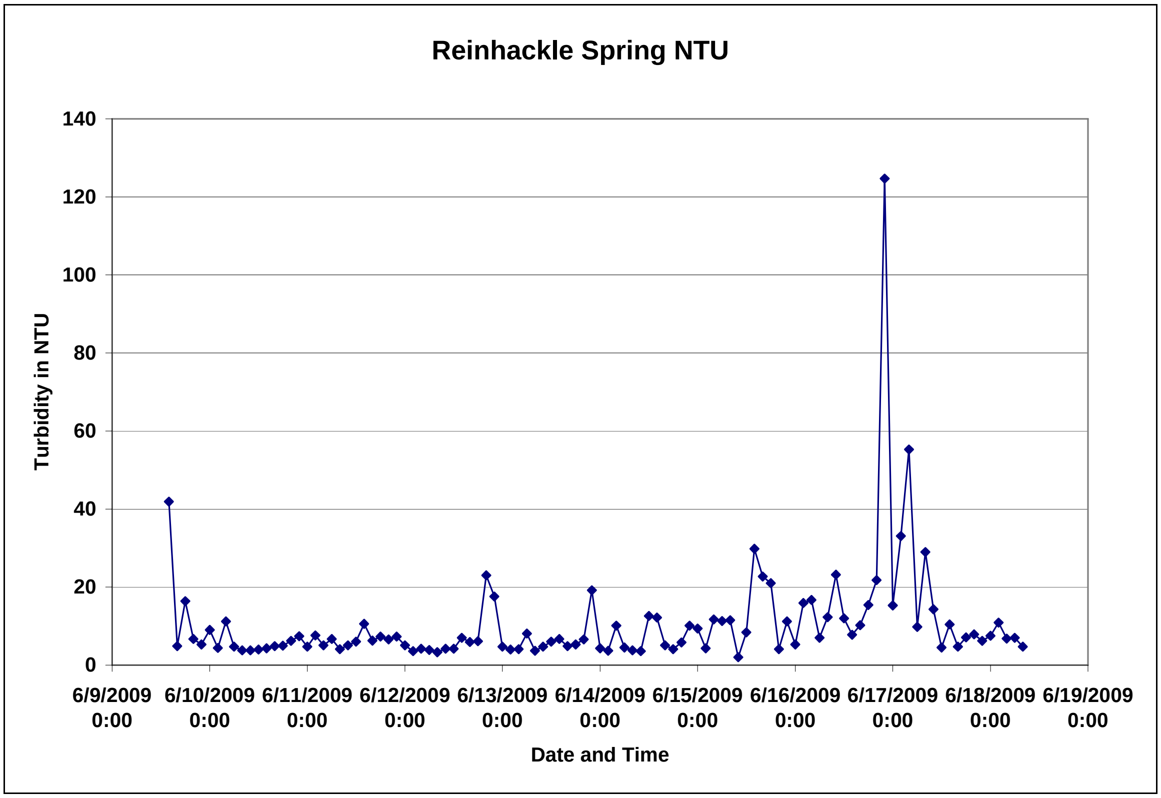

MANZANAR-REWARD ROAD ELECTRICAL CONDUCTIVITY
ELECTRICAL CONDUCTIVITY IN MICROSEIMENS PER CM
600
500
400
300
200
100
0
5/17/2009 0:00
5/22/2009 0:00
5/27/2009 0:00
6/1/2009 0:00
6/6/2009 0:00
6/11/2009 0:00
DATE AND TIME

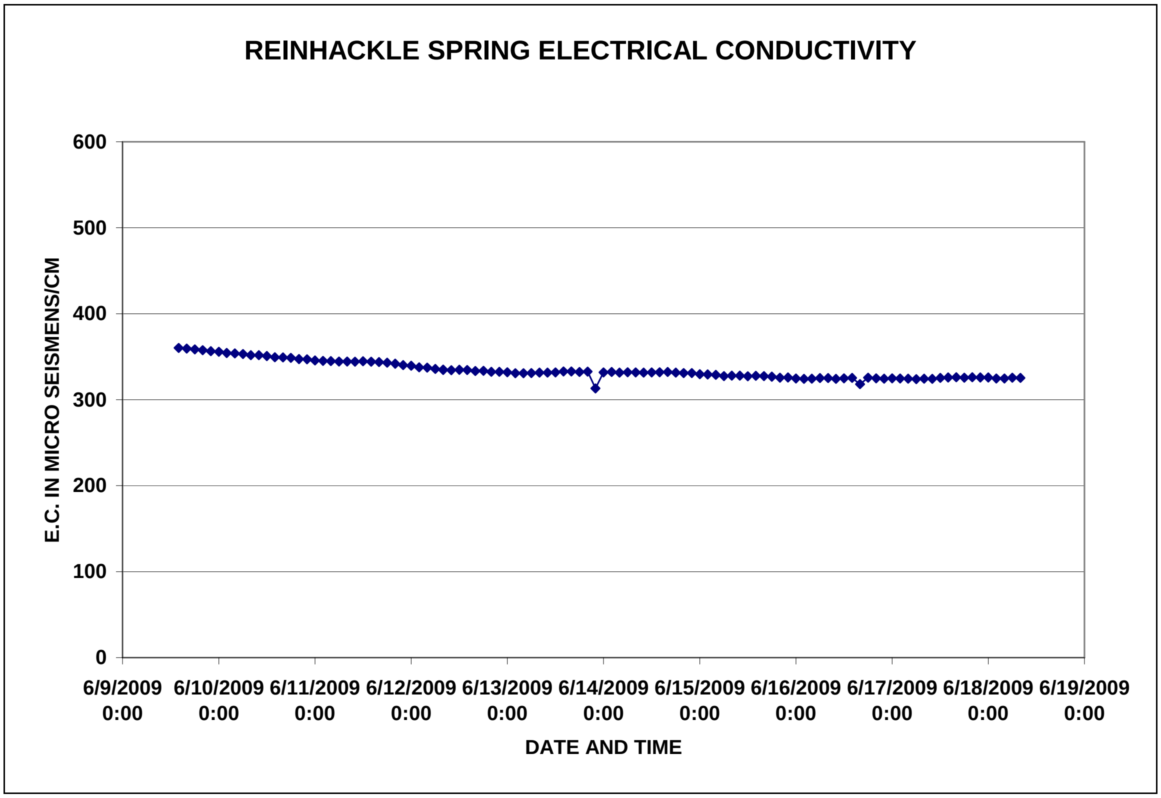

MANZANAR-REWARD ROAD pH
pH VALUE
9
8.8
8.6
8.4
8.2
8
7.8
7.6
7.4
7.2
7
5/17/2009 0:00
5/22/2009 0:00
5/27/2009 0:00
6/1/2009 0:00
6/6/2009 0:00
6/11/2009 0:00
DATE AND TIME

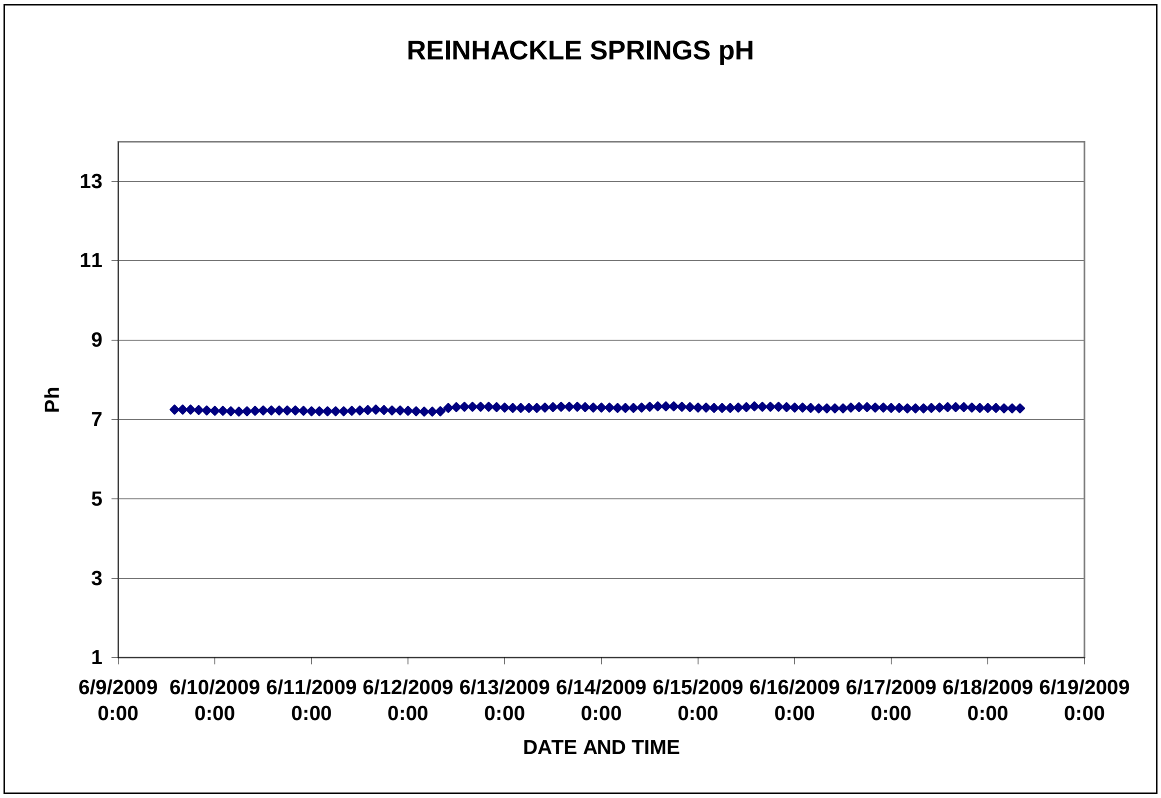
Reinhackle Spring Station



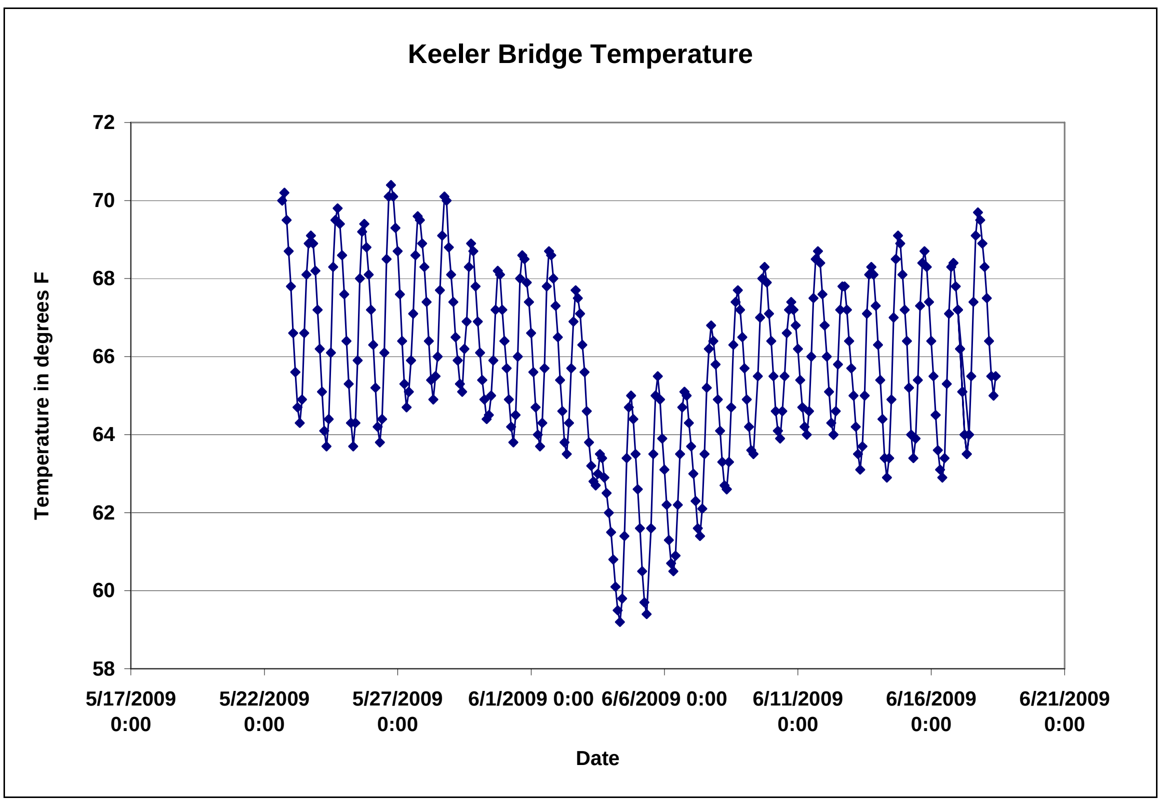


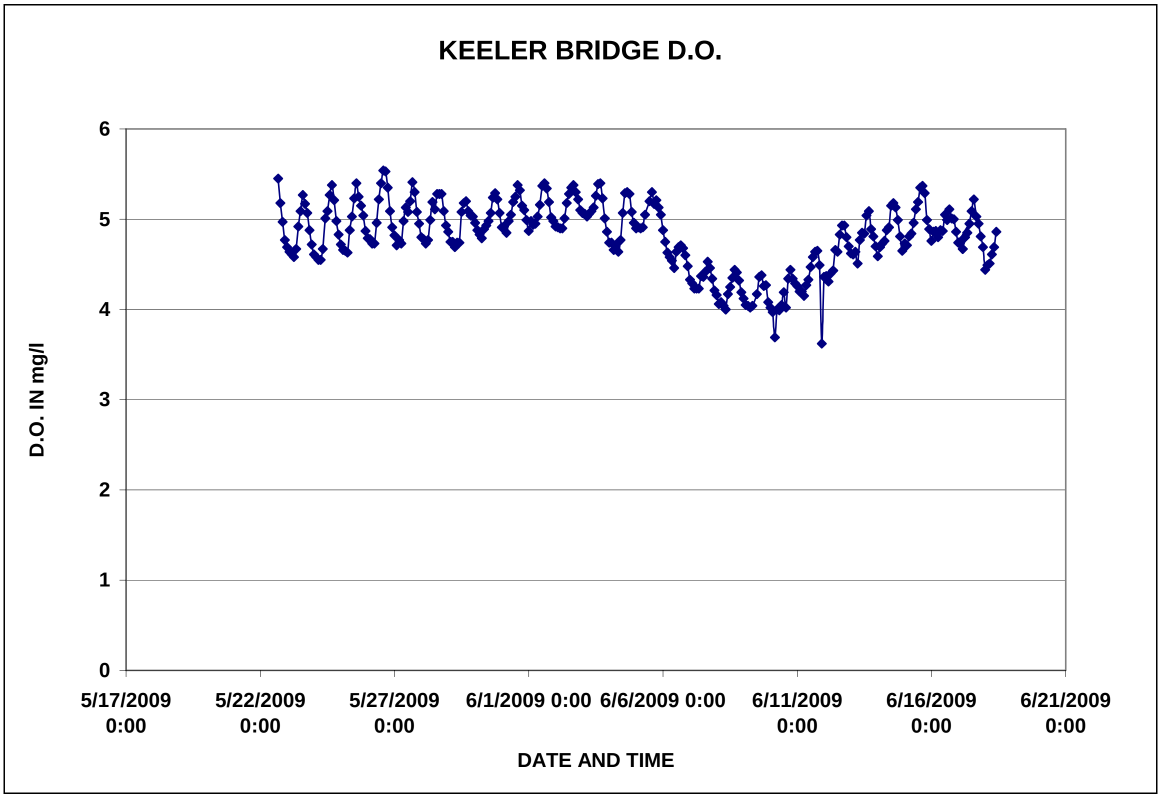

Reinhackle Spring NTU
Turbidity in NTU
140
120
100
80
60
40
20
0
6/9/2009 0:00
6/10/2009 0:00
6/11/2009 0:00
6/12/2009 0:00
6/13/2009 0:00
6/14/2009 0:00
6/15/2009 0:00
6/16/2009 0:00
6/17/2009 0:00
6/18/2009 0:00
6/19/2009 0:00
Date and Time

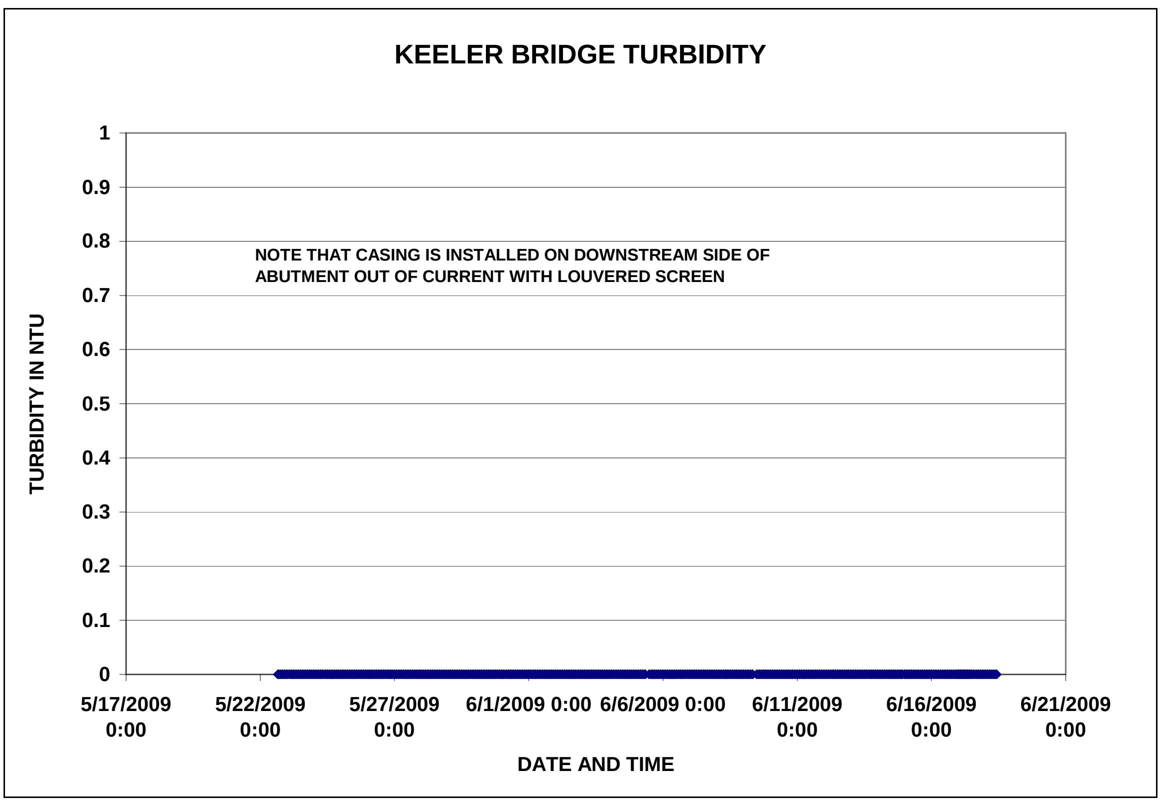

REINHACKLE SPRING ELECTRICAL CONDUCTIVITY
E.C. IN MICRO SEISMENS/CM
600
500
400
300
200
100
0
6/9/2009 0:00
6/10/2009 0:00
6/11/2009 0:00
6/12/2009 0:00
6/13/2009 0:00
6/14/2009 0:00
6/15/2009 0:00
6/16/2009 0:00
6/17/2009 0:00
6/18/2009 0:00
6/19/2009 0:00
DATE AND TIME

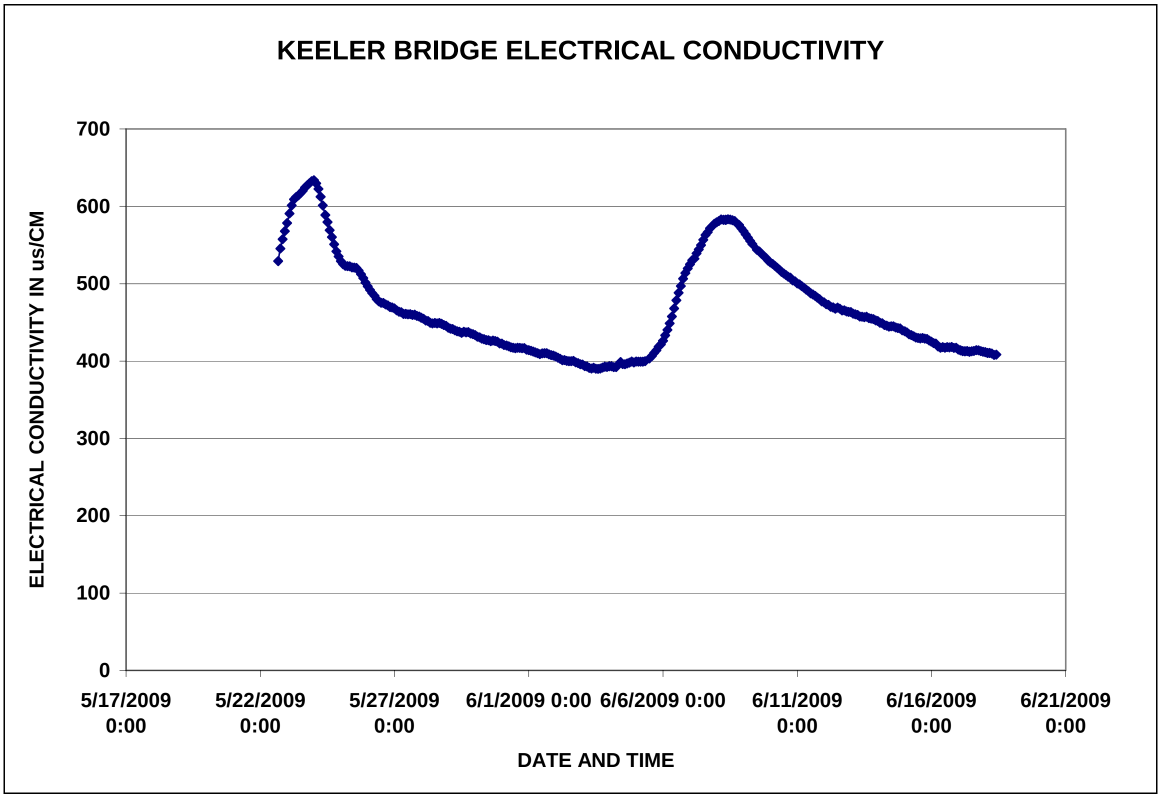


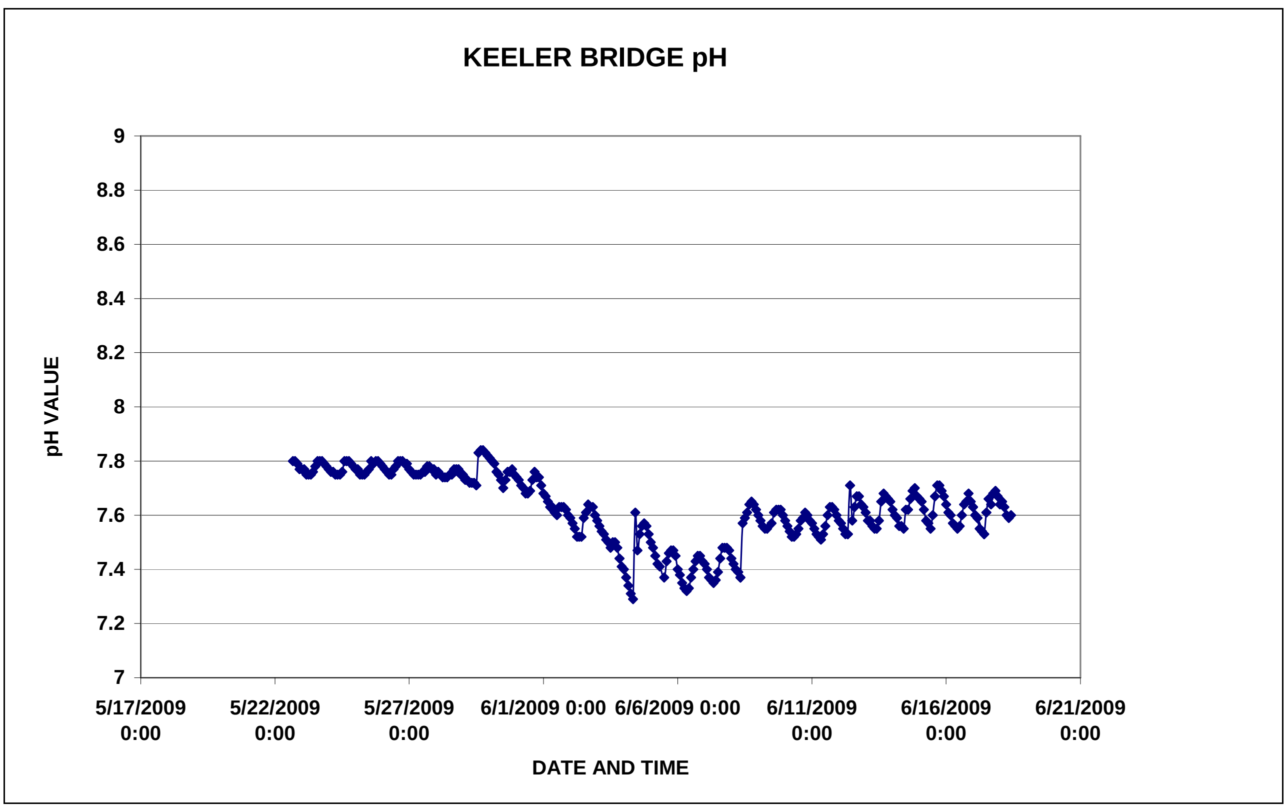
Keeler Bridge




KEELER BRIDGE D.O.
D.O. IN mg/l
0
1
2
3
4
5
6
5/17/2009 0:00
5/22/2009 0:00
5/27/2009 0:00
6/1/2009 0:00
6/6/2009 0:00
6/11/2009 0:00
6/16/2009 0:00
6/21/2009 0:00
DATE AND TIME


KEELER BRIDGE TURBIDITY
TURBIDITY IN NTU
NOTE THAT CASING IS INSTALLED ON DOWNSTREAM SIDE OF ABUTMENT OUT OF CURRENT WITH LOUVERED SCREEN
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
5/17/2009 0:00
5/22/2009 0:00
5/27/2009 0:00
6/1/2009 0:00
6/6/2009 0:00
6/11/2009 0:00
6/16/2009 0:00
6/21/2009 0:00
DATE AND TIME


KEELER BRIDGE ELECTRICAL CONDUCTIVITY
ELECTRICAL CONDUCTIVITY IN us/CM
700
600
500
400
300
200
100
0
5/17/2009 0:00
5/22/2009 0:00
5/27/2009 0:00
6/1/2009 0:00
6/6/2009 0:00
6/11/2009 0:00
6/16/2009 0:00
6/21/2009 0:00
DATE AND TIME


KEELER BRIDGE pH
pH VALUE
9
8.8
8.6
8.4
8.2
8
7.8
7.6
7.4
7.2
7
5/17/2009 0:00
5/22/2009 0:00
5/27/2009 0:00
6/1/2009 0:00
6/6/2009 0:00
6/11/2009 0:00
6/16/2009 0:00
6/21/2009 0:00
DATE AND TIME

2.14.3. Appendix 2C: Vegetation Cover Type Descriptions

A summary sheet for each of the 22 vegetation cover types referred to by this report is found below. The information pertaining to each vegetation type, along with a representative picture, is presented here for easy reference.

Vegetation Type: Greasewood – Saltbush Scrub

Community Characteristics:

Plot	1	2	3	4	5	Total
Cover %	10.3	7.5	3.5	0	0	3.3
Mean plot pos.:						1.8
Ave. patch length (m):						26
WWI score:						(FACU-)3.5
Dominant sp. origin:						native
Community complex:						saline scrub
Species abundance:						
# of dominant species in transects:						6
Total species in subplots						10

Most Common Dominant Species	Dom. score	%Freq	IV (n=56)	Groundcover: Cover type	% (n=17)
Sarcobatus vermiculatus	2.7	100	31	bareground	58
Atriplex lentiformis	2.0	84	9	litter	33
Chrysothamnus nauseosus	0.2	21	1	vegetation	5
Tamarix ramosissima	0.1	4	0	downed wood	4
unknown forb	0.1	2	1	cow manure	<1
Ephedra nevadensis	0	2	0	dead shrub	<1

Cover percentage and diversity measures:

Max (%)	LCL (%)	Mean (%)	UCL (%)	Structure	S	E	H'
19.9	2.5	3.3	4.4	shrub	15	0.7	1.9

Canopy Cover:

n	lcl	mean	ucl
17	9	17	39

Crosswalk:

Whitehorse Associates (2004)	NDDB/ Holland (1986)	Greenbook (1990)	Sawyer and Keeler-Wolf (1995)
Alkali scrub	Desert greasewood scrub or Desert sink scrub	Desert greasewood scrub or Desert sink scrub	Greasewood series

Vegetation Type: Tamarisk Cuttings/-Saltbush Scrub

Community Characteristics:

Plot	1	2	3	4	5	Total
Cover %	21.8	18.0	2.3	0.5	0	3.0
Mean plot pos.:						1.5
Ave. patch length (m):						22
WWI score:						(FACU) 3.9
Dominant sp. Origin:						exotic
Community complex:						tamarisk
Species abundance:						
# of dominant species in transects:						14
Total species in subplots						12

			n=44	Groundcover	N=16
Most Common Dominant Species	**Dom. score**	**%Freq**	**IV**	**Cover type**	**%**
tamarisk cuttings	3.0	100	97	litter	40
Atriplex lentiformis	0.8	27	1	downed wood	30
Salsola tragus	0.3	11	1	bare ground	24
				vegetation	7

Cover percentage and diversity measures:

Max (%)	LCL (%)	Mean (%)	UCL (%)	Structure	S	E	H′
49.2	1.5	3.0	5.9	shrub	3	0.7	0.8

Canopy Cover:

n	lcl	mean	ucl
16	0	7	91

Crosswalk:

Whitehorse Associates (2004)	NDDB/ Holland (1986)	Greenbook (1990)	Sawyer and Keeler-Wolf (1995)
Alkali scrub	Desert saltbush scrub	Nevada saltbush scrub*	Mixed saltbush series

Vegetation Type: Greasewood/ Russian Thistle Scrub

Community Characteristics:

Plot	1	2	3	4	5	Total
Cover %	21.8	18.0	2.3	0.5	0	8.8
Mean plot pos.:						1.5
Ave. patch length (m):						22
WWI score:						(FACU) 3.9
Dominant sp. Origin:						exotic
Community complex:						tamarisk
Species abundance:						
# of dominant species in transects:						14
Total species in subplots						12

			n=138	Groundcover	N=31
Most Common Dominant Species	**Dom. score**	**%Freq**	**IV**	**Cover type**	**%**
Salsola tragus	3.0	100	44	bare ground	74
Sarcobatus vermiculatus	0.4	13	1	litter	19
Bassia hysssopifolia	0.1	6	0	vegetation	4
Atriplex lentiformis	0.1	5	0	cow manure	2
Atriplex confertifolia	0.1	4	0	downed wood	1
Chrysothamnus nauseosus	0	2	0		
Malva neglecta	0	2	0		

Cover percentage and diversity measures:

Max (%)	LCL (%)	Mean (%)	UCL (%)	Structure	S	E	H'
45.3	6.6	8.8	11.5	shrub	14	0.4	1.0

Canopy Cover:

n	lcl	mean	ucl
31	4	6	10

Crosswalk:

Whitehorse Associates (2004)	NDDB/ Holland (1986)	Greenbook (1990)	Sawyer and Keeler-Wolf (1995)
Alkali scrub	Desert greasewood scrub or Desert	Desert greasewood scrub or Desert	Greasewood series

Vegetation Type: Saltbush/ Russian Thistle Scrub

Community Characteristics:

Plot	1	2	3	4	5	Total
Cover %	28.8	18.1	2.2	0.3	0	9.7
Mean plot pos.:						1.5
Ave. patch length (m):						23
WWI score:						(FAC) 3.2
Dominant sp. Origin:						exotic
Community complex:						tamarisk
Species abundance:						
# of dominant species in transects:						15
Total species in subplots						10

			n=146	Groundcover	N=43
Most Common Dominant Species	Dom. score	%Freq	IV	Cover type	%
Salsola tragus	3.0	99	43	litter	47
				bare ground	35
Atriplex lentiformis	2.4	82	10		
				vegetation	11
Tamarix ramosissima	0.8	26	4		
				downed wood	4
Chrysothamnus nauseosus	0.3	14	1		
Distichlis spicata	0.3	11	0	rock	1
Atriplex pusilla	0.2	8	5	cow manure	1
				dead shrub	1
				water	<1

Cover percentage and diversity measures:

Max (%)	LCL (%)	Mean (%)	UCL (%)	Structure	S	E	H′
62.2	6.9	9.7	13.1	shrub	15	0.6	1.5

Canopy Cover:

n	lcl	mean	ucl
43	18	25	35

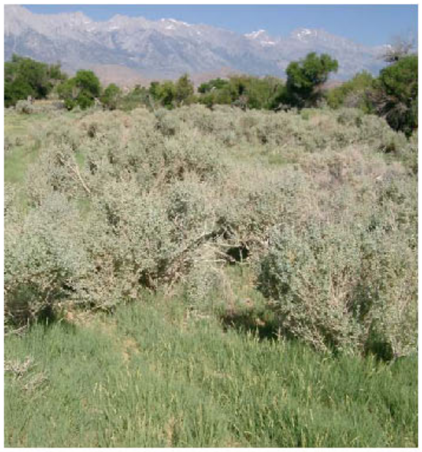
Crosswalk:

Whitehorse Associates (2004)	NDDB/ Holland (1986)	Greenbook (1990)	Sawyer and Keeler-Wolf (1995)
Alkali scrub	Desert saltbush scrub	Nevada saltbush scrub*	Mixed saltbush series

Vegetation Type: Saltbush/ Saltgrass Scrub Meadow

Community Characteristics:

Plot	1	2	3	4	5	Total
Cover %	3.7	17.5	11.5	2.0	7.9	8.3
Mean plot pos.:						3.2
Ave. patch length (m):						23
WWI score:						(FAC+)2.6
Dominant sp. Origin:						native
Community complex:			Saltbush/ saltgrass scrub			
Species abundance:						
# of dominant species in transects:						11
Total species in subplots						12



Most Common Dominant Species	Dom. score	%Freq	IV (n=146)
Atriplex lentiformis	3.0	99	15
Distichlis spicata	2.0	66	6
Chrysothamnus nauseosus	0.4	21	1
Phragmites australis	0.1	3	0
Sarcobatus vermiculatus	0.1	3	0
tamarisk cuttings	0.0	1	0
Suaeda moquinii	0.0	1	0
Sporobolus airoides	0.0	1	0

Groundcover (n=42) Cover type	%
litter	49
vegetation	27
bare ground	18
downed wood	4
cow manure	1
dead shrub	<1

Cover percentage and diversity measures:

Max (%)	LCL (%)	Mean (%)	UCL (%)	Structure	S	E	H'
55.9	6.3	8.3	11.2	shrub	11	0.5	1.2

Canopy Cover:

n	lcl	mean	ucl
42	39	50	64

Crosswalk:

Whitehorse Associates (2004)	NDDB/ Holland (1986)	Greenbook (1990)	Sawyer and Keeler-Wolf (1995)
Alkali scrub/meadow	Desert saltbush scrub	Nevada saltbush meadow*	Mixed saltbush series

Vegetation Type: Alkalai Sacatone/ Saltgrass Meadow

Community Characteristics:

Plot	1	2	3	4	5	Total
Cover %	2.8	0.8	18.3	19.6	15.5	11.1
Mean plot pos.:						4
Ave. patch length (m):						23
WWI score:						(FAC+)2.5
Dominant sp. Origin:						native
Community complex:						Saltbush/ saltgrass scrub
Species abundance:						
# of dominant species in transects:						28
Total species in subplots						23

Most Common Dominant Species	Dom. score	%Freq	IV (n=212)	Groundcover Cover type	% (n=57)
Sporobolus airoides	2.9	100	67	vegetation	38
Distichlis spicata	2.5	84	9	litter	29
Chrysothamnus nauseosus	1.4	51	10	bare ground	29
Atriplex lentiformis	1.3	53	3	downed wood	2
Suaeda moquinii	0.3	13	1	cow manure	1
Juncus balticus	0.2	10	1	dead grass	1
Glycyrrhiza lepidota	0.2	10	1	dead shrub	1

Cover percentage and diversity measures:

Max (%)	LCL (%)	Mean (%)	UCL (%)	Structure	S	E	H′
62.3	8.7	11.1	13.9	grass	28	0.6	1.9

Canopy Cover:

n	lcl	mean	ucl
57	49	61	71

Crosswalk:

Whitehorse Associates (2004)	NDDB/ Holland (1986)	Greenbook (1990)	Sawyer and Keeler-Wolf (1995)
Dry alkali meadow	Valley sacaton grasslands	Alkali meadow	Alkali sacaton series

Vegetation Type: Greasewood-Seepweed-Shadscale Scrub

Community Characteristics:

Plot	1	2	3	4	5	Total
Cover %	2.0	3.5	9.6	8.3	7.7	6.4
Mean plot pos.:						3.8
Ave. patch length (m):						22
WWI score:					(FAC)	3.2
Dominant sp. Origin:						native
Community complex:						Saline scrub
Species abundance:						
# of dominant species in transects:						15
Total species in subplots						13

Most Common Dominant Species	Dom. score	%Freq	IV (n=111)
Sarcobatus vermiculatus	2.8	96	30
Suaeda moquinii	2.2	81	27
Atriplex confertifolia	1.3	49	14
Distichlis spicata	1.2	39	2
Sporobolus airoides	0.8	26	5
Atriplex lentiformis	0.8	34	1
Chrysothamnus nauseosus	0.3	14	1

Groundcover (n=24)

Cover type	%
bare ground	67
litter	18
vegetation	13
downed wood	1
dead shrub	1
cow pie	1

Cover percentage and diversity measures:

Max (%)	LCL (%)	Mean (%)	UCL (%)	Structure	S	E	H′
25.6	5.1	6.4	7.8	shrub	15	0.7	1.9

Canopy Cover:

n	lcl	mean	ucl
24	21	30	50

Crosswalk:

Whitehorse Associates (2004)	NDDB/ Holland (1986)	Greenbook (1990)	Sawyer and Keeler-Wolf (1995)
Alkali scrub	Desert greasewood scrub or Desert sink scrub	Desert greasewood scrub or Desert sink scrub	Greasewood series

Vegetation Type: Rabbitbrush- Saltbush/ Saltgrass Scrub Meadow

Community Characteristics:

Plot	1	2	3	4	5	Total
Cover %	5.8	4.7	16.4	1.2	4.9	6.1
Mean plot pos.:						3.3
Ave. patch length (m):						20
WWI score:						(FAC+) 2.6
Dominant sp. Origin:						native
Community complex:		Saltbush/ saltgrass scrub				
Species abundance:						
# of dominant species in transects:						24
Total species in subplots						17

Most Common Dominant Species	Dom. score	%Freq	IV (n=123)
Chrysothamnus nauseosus	2.7	98	36
Atriplex lentiformis	1.6	75	6
Distichlis spicata	1.4	47	3
Suaeda moquinii	0.4	13	1
Glycyrrhiza lepidota	0.4	12	1
Juncus balticus	0.3	12	1
Anemopsis californica	0.3	11	1

Groundcover: Cover type (n=35)	%
litter	44
vegetation	32
bare ground	19
downed wood	4
cow pie	1
dead shrub	1

Cover percentage and diversity measures:

Max (%)	LCL (%)	Mean (%)	UCL (%)	Structure	S	E	H′
38.1	4.5	6.1	7.9	shrub	24	0.7	2.1

Canopy Cover:

n	lcl	mean	ucl
35	57	71	85

Crosswalk:

Whitehorse Associates (2004)	NDDB/ Holland (1986)	Greenbook (1990)	Sawyer and Keeler-Wolf (1995)
Alkali scrub/meadow	Desert saltbush scrub	Rabbitbrush meadow*	Rubber rabbitbrush series

Vegetation Type: Tamarisk / Saltbush Woodland

Community Characteristics:

Plot	1	2	3	4	5	Total
Cover %	6.1	16.5	0.1	1.2	0.3	4.7
Mean plot pos.:						1.9
Ave. patch length (m):						22
WWI score:						(FAC+)2.4
Dominant sp. Origin:						exotic
Community complex:						tamarisk
Species abundance:						
# of dominant species in transects:						14
Total species in subplots						10

Most common Dominant Species	Dom. score	%Freq	IV (n=123)	Groundcover Cover type	% (n=35)
Tamarix ramosissima	3.0	99	51	litter	61
Atriplex lentiformis	2.0	69	7	vegetation	25
Distichlis spicata	0.8	26	1	bare ground	7
Chrysothamnus nauseosus	0.1	5	0	downed wood	6
Elaeagnus angustifolia	0.1	2	1	cow manure	1
Malva neglecta	0	2	0		
Anemopsis californica	0	2	0		

Cover percentage and diversity measures:

Max (%)	LCL (%)	Mean (%)	UCL (%)	Structure	S	E	H′
41.9	3.4	4.7	6.6	tree	14	0.5	1.3

Canopy Cover:

n	lcl	mean	ucl
35	53	67	78

Crosswalk:

Whitehorse Associates (2004)	NDDB/ Holland (1986)	Greenbook (1990)	Sawyer and Keeler-Wolf (1995)
Tamarisk	Tamarisk scrub	Tamarisk scrub	Tamarisk series

Vegetation Type: Smotherweed-Mixed Shrubland

Community Characteristics:

Plot	1	2	3	4	5	Total
Cover %	3.2	0.6	0.7	0.7	0.1	1.2
Mean plot pos.:						2.2
Ave. patch length (m):						19
WWI score:						(FAC+)3.1
Dominant sp. Origin:						exotic
Community complex:						Saline scrub
Species abundance:						
# of dominant species in transects:						12
Total species in subplots:						9

			n=20	Groundcover	n=5
Most Common Dominant Species	**Dom. score**	**%Freq**	**IV**	**Cover type**	**%**
Bassia hyssopifolia	3.0	100	88	bare ground	50
Sarcobatus vermiculatus	1.1	35	4	litter	31
Distichlis spicata	1.1	35	2	vegetation	18
Atriplex lentiformis	1.0	40	2	downed wood	<1
Leymus triticoides	0.4	15	1	cow manure	<1
Salsola tragus	0.2	10	0		
Salix gooddingii	0.2	5	0		

Cover percentage and diversity measures:

Max (%)	LCL (%)	Mean (%)	UCL (%)	Structure	S	E	H′
18.7	0.6	1.2	2.2	herbaceous	12	0.7	1.8

Canopy Cover:

n	lcl	mean	ucl
5	0	37	421

Crosswalk:

Whitehorse Associates (2004)	NDDB/ Holland (1986)	Greenbook (1990)	Sawyer and Keeler-Wolf (1995)
Alkali scrub	Desert saltbush scrub	Non-native vegetation and misc. lands*	Mixed saltbush series

Vegetation Type: Saltgrass Meadow

Community Characteristics:

Plot	1	2	3	4	5	Total
Cover %	0.2	0.2	1.5	5.7	19.2	5.3
Mean plot pos.:						4.6
Ave. patch length (m):						20
WWI score:						(FACW) 2.0
Dominant sp. Origin:						native
Community complex:			Saltbush/ saltgrass scrub			
Species abundance:						
# of dominant species in transects:						6
Total species in subplots						14

			n=137	Groundcover	n=24
Most common Dominant Species	**Dom. score**	**%Freq**	**IV**	**Cover type**	**%**
Distichlis spicata	3.0	100	13	litter	41
Anemopsis californica	0.1	4	0	vegetation	41
Lolium sp.	0	1	0	bare ground	10
Ambrosia acanthicarpa	0	1	0	road	4
Atriplex pusilla	0	1	0	cow manure	2
Juncus balticus	0	1	0	downed wood	2
				ant hill	<1

Cover percentage and diversity measures:

Max (%)	LCL (%)	Mean (%)	UCL (%)	Structure	S	E	H'
36.8	3.8	5.3	7.5	grass	6	0.1	0.3

Canopy Cover:

n	lcl	mean	ucl
24	55	70	82

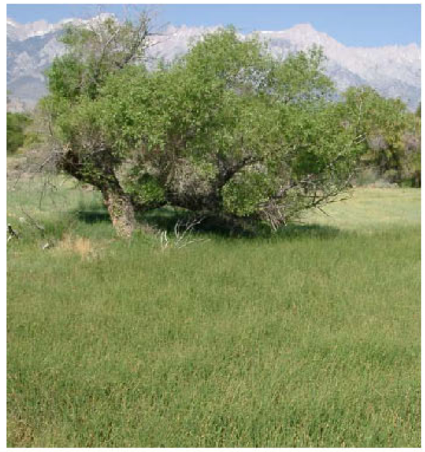
Crosswalk:

Whitehorse Associates (2004)	NDDB/ Holland (1986)	Greenbook (1990)	Sawyer and Keeler-Wolf (1995)
Dry alkali meadow	Alkali meadow	Alkali meadow	Saltgrass sereies

Vegetation Type: Goodding's Willow Woodland

Community Characteristics:

Plot	1	2	3	4	5	Total
Cover %	0.4	4.9	10.0	5.6	7.8	5.7
Mean plot pos.:						3.8
Ave. patch length (m):						15
WWI score:						(FACW+) 1.8
Dominant sp. Origin:						native
Community complex:						Willow wet meadow
Species abundance:						
# of dominant species in transects:						39
Total species in subplots						32



Most common Dominant Species	Dom. score	%Freq	IV (n=162)	Groundcover: Cover type	%
Salix gooddingii	2.9	96	51	vegetation	42
Distichlis spicata	1.7	58	4	litter	40
Atriplex lentiformis	0.9	31	1	bare ground	9
Leymus triticoides	0.8	29	4	downed wood	6
Scirpus americanus	0.5	20	2	dead shrub	1
Tamarix ramosissima	0.5	24	2	water	1
Anemopsis californica	0.5	17	2	cow manure	1
				rock	<1
				dead tree	<1

Cover percentage and diversity measures:

Max (%)	LCL (%)	Mean (%)	UCL (%)	Structure	S	E	H′
34.2	4.4	5.7	7.5	tree	39	0.7	2.4

Canopy Cover:

n	lcl	mean	ucl
43	78	93	110

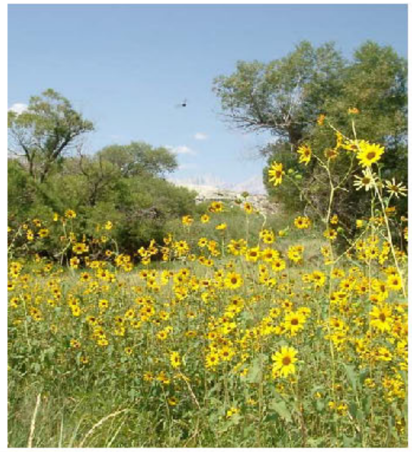
Crosswalk:

Whitehorse Associates (2004)	NDDB/ Holland (1986)	Greenbook (1990)	Sawyer and Keeler-Wolf (1995)
Riparian Forest (willow)	Modoc-Great Basin cottonwood/willow riparian forest and Mojave riparian forest	Modoc-Great Basin cottonwood/willow riparian forest and Mojave riparian forest	Black willow series

Vegetation Type: Sunflower-Licorice Wet Meadow

Community Characteristics:

Plot	1	2	3	4	5	Total
Cover %	0	0.2	0.3	0.7	2.3	0.7
Mean plot pos.:						4.6
Ave. patch length (m):						10
WWI score:						(FACW) 2.1
Dominant sp. Origin:						native
Community complex:						Willow wet meadow
Species abundance:						
# of dominant species in transects:						30
Total species in subplots						19



Most Common dominant Species	Dom. score	%Freq	IV (n=33)
Helianthus annuus	1.2	46	24
Glycyrrhiza lepidota	0.7	30	7
Distichlis spicata	0.7	27	1
Rosa woodsii	0.5	15	7
Xanthium strumarium	0.5	21	10
Anemopsis californica	0.4	15	1
Malva neglecta	0.4	15	10
Leymus triticoides	0.4	18	1

Groundcover n=7

Cover type	%
litter	50
vegetation	34
bare ground	7
downed wood	4
water	4
cow manure	1

Cover percentage and diversity measures:

Max (%)	LCL (%)	Mean (%)	UCL (%)	Structure	S	E	H'
9.3	0.4	0.7	1.1	herbaceous	30	0.9	2.9

Canopy Cover:

n	lcl	mean	ucl
7	25	95	172

Crosswalk:

Whitehorse Associates (2004)	NDDB/ Holland (1986)	Greenbook (1990)	Sawyer and Keeler-Wolf (1995)
Wet Alkali meadow (rush/sedge)	Transmontane alkali marsh	Rush-sedge meadow*	Sedge series

Vegetation Type: Baltic Rush – Saltgrass Wet Meadow

Community Characteristics:

Plot	1	2	3	4	5	Total
Cover %	0	0.6	3.5	4.8	3.5	2.5
Mean plot pos.:						4.2
Ave. patch length (m):						15
WWI score:						(FACW+) 1.6
Dominant sp. Origin:						native
Community complex:						Willow wet meadow
Species abundance:						
# of dominant species in transects:						30
Total species in subplots						41

Most Common Dominant Species	Dom. score	%Freq	IV (n=74)
Juncus balticus	2.7	97	60
Distichlis spicata	1.3	60	3
Anemopsis californica	0.7	35	5
Salix gooddingii	0.4	15	1
Tamarix ramosissima	0.4	14	1
Atriplex lentiformis	0.4	14	0
Glycyrrhiza lepidota	0.3	15	2
Helianthus annuus	0.3	14	2

Groundcover

Cover type	%
vegetation	46
litter	36
water	9
bare ground	6
downed wood	2
cow manure	1

Cover percentage and diversity measures:

Max (%)	LCL (%)	Mean (%)	UCL (%)	Structure	S	E	H′
23.5	1.7	2.5	3.6	grass	30	0.7	2.5

Canopy Cover:

n	lcl	mean	ucl
21	59	84	109

Crosswalk:

Whitehorse Associates (2004)	NDDB/ Holland (1986)	Greenbook (1990)	Sawyer and Keeler-Wolf (1995)
Wet Alkali meadow (rush/sedge)	Transmontane alkali marsh	Rush-sedge meadow*	Sedge series

Vegetation Type: Seepweed-Saltbush/ Saltgrass Scrub Meadow

Community Characteristics:

Plot	1	2	3	4	5	Total
Cover %	0	2.1	3.9	1.8	3.5	2.1
Mean plot pos.:						3.7
Ave. patch length (m):						19
WWI score:						(FAC+) 2.6
Dominant sp. Origin:						native
Community complex:						Saltbush/ saltgrass scrub
Species abundance:						
# of dominant species in transects:						12
Total species in subplots:						15

Most Common Dominant Species	Dom. score	%Freq	IV (n=51)	Cover type (Groundcover)	%
Suaeda moquinii	3	100	47	bare ground	57
Atriplex lentiformis	1.9	65	6	litter	23
Distichlis spicata	1.8	61	5	vegetation	19
Atriplex confertifolia	0.3	10	1	downed wood	1
Sarcobatus vermiculatus	0.2	10	0	cow manure	1
Chrysothamnus nauseosus	0.1	6	0	human trash	<1
Stephanomeria pauciflora	0.1	4	2		

Cover percentage and diversity measures:

Max (%)	LCL (%)	Mean (%)	UCL (%)	Structure	S	E	H′
18.4	1.4	2.1	3.1	shrub	12	0.6	1.6

Canopy Cover:

n	lcl	mean	ucl
16	30	44	65

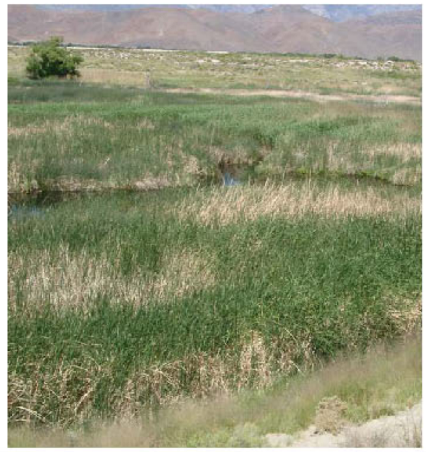
Crosswalk:

Whitehorse Associates (2004)	NDDB/ Holland (1986)	Greenbook (1990)	Sawyer and Keeler-Wolf (1995)
Alkali scrub/meadow	Desert saltbush scrub	Nevada saltbush meadow*	Mixed saltbush series

Vegetation Type: Willow/ Cattail – Rush Wetland

Community Characteristics:

Plot	1	2	3	4	5	Total
Cover %	0.0	0.0	7.9	16.6	4.9	6.2
Mean plot pos.:						4.2
Ave. patch length (m):						24
WWI score:						(OBL) 1.1
Dominant sp. Origin:						native
Community complex:						Emergent wetland
Species abundance:						
# of dominant species in transects:						20
Total species in subplots						15



Most Common Dominant Species	Dom. score	%Freq	IV (n=102)	Groundcover Cover type	% (n=20)
Typha latifolia	3.0	100	58	vegetation	44
Salix gooddingii	0.9	30	5	litter	31
Scirpus americanus	0.6	26	3	water	18
Lemna sp.	0.1	4	3	bare ground	5
Juncus balticus	0.1	4	0	downed wood	2
Tamarix ramosissima	0.1	4	0	dead tree	<1
Scirpus acutus	0.1	3	0		

Cover percentage and diversity measures:

Max (%)	LCL (%)	Mean (%)	UCL (%)	Structure	S	E	H′
46.0	4.5	6.2	8.5	emergent	20	0.5	1.5

Canopy Cover:

n	lcl	mean	ucl
20	39	63	89

Crosswalk:

Whitehorse Associates (2004)	NDDB/ Holland (1986)	Greenbook (1990)	Sawyer and Keeler-Wolf (1995)
Marsh	Transmontane alkali marsh	Transmontane alkali marsh	Cattail series

Vegetation Type: Shadscale Scrub

Community Characteristics:

Plot	1	2	3	4	5	Total
Cover %	0.0	0.0	2.6	8.2	6.0	3.3
Mean plot pos.:						4.2
Ave. patch length (m):						24
WWI score:						(UPL)3.8
Dominant sp. Origin:						native
Community complex:						Saline scrub
Species abundance:						
# of dominant species in transects:						15
Total species in subplots:						11

Most Common Dominant Species	Dom. score	%Freq	IV (n=64)	Cover type (Groundcover)	% (n=13)
Atriplex confertifolia	2.8	95	60	bare ground	91
Sarcobatus vermiculatus	1.2	45	6	litter	5
Psorothamnus polydenius	1.0	41	37	vegetation	4
Chrysothamnus nauseosus	0.6	25	2	dead shrub	<1
Atriplex canescens	0.4	17	13	downed wood	<1
Salsola tragus	0.2	8	0	cow manure	<1
Suaeda moquinii	0.2	9	0		

Cover percentage and diversity measures:

Max (%)	LCL (%)	Mean (%)	UCL (%)	Structure	S	E	H'
19.9	2.5	3.3	4.4	shrub	15	0.7	1.9

Canopy Cover:

n	lcl	mean	ucl
13	6	12	28

Crosswalk:

Whitehorse Associates (2004)	NDDB/ Holland (1986)	Greenbook (1990)	Sawyer and Keeler-Wolf (1995)
Alkali scrub	Shadscale scrub	Shadscale scrub	Shadscale series

Vegetation Type: Bull Rush- Cattail-Willow Wetland

Community Characteristics:

Plot	1	2	3	4	5	Total
Cover %	0.0	0.0	2.0	12.3	2.6	4.1
Mean plot pos.:						4.3
Ave. patch length (m):						22
WWI score:						(OBL) 1.0
Dominant sp. Origin:						native
Community complex:						Emergent wetland
Species abundance:						
# of dominant species in transects:						10
Total species in subplots						7

Most Common Dominant Species	Dom. score	%Freq	IV (n=51)	Cover type (Groundcover, n=10)	%
Scirpus acutus	2.7	100	83	water	38
Typha latifolia	1.4	55	15	litter	31
Salix gooddingii	0.7	24	3	vegetation	25
Salix laevigata	0.1	4	1	downed wood	5
Atriplex lentiformis	0.1	2	0	bare ground	1
Polygonum hydropiperoides	0.1	4	2	cow manure	<1
Lemna sp.	0.1	2	1		

Cover percentage and diversity measures:

Max (%)	LCL (%)	Mean (%)	UCL (%)	Structure	S	E	H'
48.5	2.5	4.1	6.7	emergent	10	0.6	1.3

Canopy Cover:

n	lcl	mean	ucl
10	15	57	92

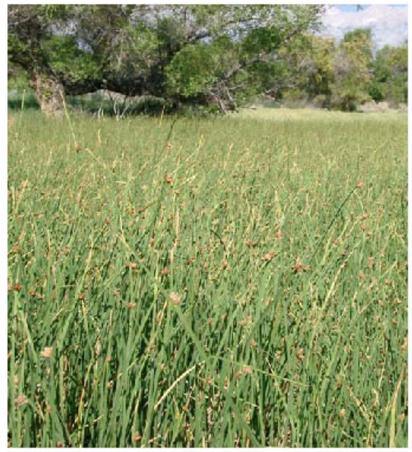
Crosswalk:

Whitehorse Associates (2004)	NDDB/ Holland (1986)	Greenbook (1990)	Sawyer and Keeler-Wolf (1995)
Marsh	Transmontane alkali marsh	Transmontane alkali marsh	Bullrush series

Vegetation Type: Chairmaker's Bullrush/Saltgrass Wet Meadow

Community Characteristics:

Plot	1	2	3	4	5	Total
Cover %	0.0	0.0	1.1	2.9	1.3	1.2
Mean plot pos.:						4.1
Ave. patch length (m):						8
WWI score:						(OBL-) 1.4
Dominant sp. Origin:						native
Community complex:						Willow wet meadow
Species abundance:						
# of dominant species in transects:						21
Total species in subplots						19



Most Common Dominant Species	Dom. score	%Freq	IV (n=54)
Scirpus americanus	2.9	100	63
Distichlis spicata	1.2	48	3
Anemopsis californica	0.9	33	6
Juncus balticus	0.4	15	1
Tamarix ramosissima	0.2	7	0
Polypogon monspeliensis	0.1	6	2
Xanthium strumarium	0.1	6	1

Groundcover (n=8)

Cover type	%
vegetation	45
litter	45
bare ground	10
cow manure	1

Cover percentage and diversity measures:

Max (%)	LCL (%)	Mean (%)	UCL (%)	Structure	S	E	H'
14.8	0.7	1.2	1.9	emergent	21	0.6	1.9

Canopy Cover:

n	lcl	mean	ucl
8	57	87	128

Crosswalk:

Whitehorse Associates (2004)	NDDB/ Holland (1986)	Greenbook (1990)	Sawyer and Keeler-Wolf (1995)
Wet Alkali meadow (rush/sedge)	Transmontane alkali marsh	Rush-sedge meadow*	Sedge series

Vegetation Type: Common Reed/ Yerba Mansa

Community Characteristics:

Plot	1	2	3	4	5	Total
Cover %	0.0	0.0	0.1	2.4	1.9	0.9

Mean plot pos.: 4.5
Ave. patch length (m): 16
WWI score: (FACW+) 1.7
Dominant sp. Origin: native
Community complex: Common Reed
Species abundance:
# of dominant species in transects: 15
Total species in subplots 12

			n=27	Groundcover	n=6
Most Common Dominant Species	**Dom. score**	**%Freq**	**IV**	**Cover type**	**%**
Phragmites australis	3.0	100	87	litter	65
Anemopsis californica	1.4	48	13	vegetation	32
Salix exigua	1.0	33	8	water	2
Apocynum cannabinum	0.3	15	15	bare ground	1
Chrysothamnus nauseosus	0.3	15	1	cow manure	<1
Typha latifolia	0.3	11	1		
Helianthus annuus	0.2	11	1		

Cover percentage and diversity measures:

Max (%)	LCL (%)	Mean (%)	UCL (%)	Structure	S	E	H'
10.3	0.5	0.9	1.5	shrub	15	0.7	1.9

Canopy Cover:

n	lcl	mean	ucl
6	55	99	241

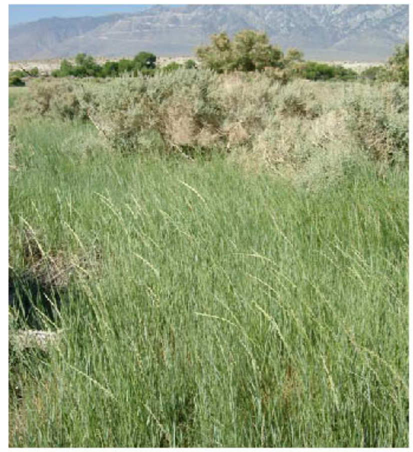
Crosswalk:

Whitehorse Associates (2004)	NDDB/ Holland (1986)	Greenbook (1990)	Sawyer and Keeler-Wolf (1995)
Reedgrass	Transmontane alkali marsh	Transmontane alkali marsh	Common reed series

Vegetation Type: Wildrye/ Saltgrass Meadow

Community Characteristics:

Plot	1	2	3	4	5	Total
Cover %	0.0	0.0	0.6	2.8	6.4	2.0
Mean plot pos.:						1.5
Ave. patch length (m):						11
WWI score:						(FAW-) 2.2
Dominant sp. Origin:						native
Community complex:						Willow wet meadow
Species abundance:						
# of dominant species in transects:						21
Total species in subplots:						23



Most Common Dominant Species	Dom. score	%Freq	n=89 IV	Groundcover Cover type	%
Leymus triticoides	2.8	99	46	vegetation	60
Distichlis spicata	2.3	78	8	litter	28
Glycyrrhiza lepidota	0.6	26	5	bare ground	6
Atriplex lentiformis	0.5	18	0	downed wood	4
Juncus balticus	0.3	12	1	dead shrub	1
Scirpus ameicanus	0.2	9	0	cow manure	1
Anemopsis californica	0.2	9	0		

Cover percentage and diversity measures:

Max (%)	LCL (%)	Mean (%)	UCL (%)	Structure	S	E	H′
23.7	1.3	2.0	3.1	grass	21	0.6	1.8

Canopy Cover:

n	lcl	mean	ucl
7	78	113	184

Crosswalk:

Whitehorse Associates (2004)	NDDB/ Holland (1986)	Greenbook (1990)	Sawyer and Keeler-Wolf (1995)
Dry alkali meadow	Valley wildrye grasslands	Alkali meadow	Creeping ryegrass series

Vegetation Type: Coyote Willow/ Saltgrass Riparian Shrubland

Community Characteristics:

Plot	1	2	3	4	5	Total
Cover %	0.0	0.0	0.2	0.7	3.0	0.8

Mean plot pos.: 1.5
Ave. patch length (m): 11
WWI score: (FAC+)1.8
Dominant sp. Origin: native
Community complex: Willow wet meadow
Species abundance:
# of dominant species in transects: 19
Total species in subplots: 18

Most Common Dominant Species	Dom. score	%Freq	IV (n=36)	Groundcover: Cover type	% (n=7)
Salix exigua	3	100	71	litter	45
Distichlis spicata	1.2	42	2	vegetation	33
Leymus triticoides	1.1	36	6	bare ground	13
Glycyrrhiza lepidota	0.6	22	4	downed wood	9
Atriplex lentiformis	0.5	31	1	cow manure	<1
Anemopsis californica	0.5	19	2		
Chrysothamnus nauseosus	0.3	17	1		

Cover percentage and diversity measures:

Max (%)	LCL (%)	Mean (%)	UCL (%)	Structure	S	E	H′
15.5	0.4	0.8	1.6	shrub	19	0.8	15.5

Canopy Cover:

n	lcl	mean	ucl
7	78	113	184

Crosswalk:

Whitehorse Associates (2004)	NDDB/ Holland (1986)	Greenbook (1990)	Sawyer and Keeler-Wolf (1995)
Riparian Shrub (willow)	Modoc-Great Basin riparian scrub	Modoc-Great Basin riparian scrub	Narrowleaf willow series

2.14.4. Appendix 2D: River Flow Data for LORP May 24 to June 16, 2009

Flow Data (cfs) in the Lower Owens River for May 24, 2009 to June 16, 2009. River flow data is maintained by LADWP and presented at the following website: http://www.ladwp.com/ladwp/cms/ladwp009121.jsp

Flow Gaging Station / Date	Intake	Blackrock	E/O Goose	Two Culverts	Mazourka	Manzanar	Reinhackle	LP at NG Rd	Keeler Bridge	Above Pumpstation	Pumpback	Lange- mann Release to Delta	Weir to Delta
05/24/09	48.4	50.4	53.4	48.4	48.4	46.4	52.4	45.4	43.4	43.34	38.3	5.04	0
05/25/09	58.5	53.4	52.4	48.4	47.4	47.4	53.4	44.4	44.4	46.34	41.3	5.04	0
05/26/09	72.6	62.5	56.5	49.4	47.4	48.4	53.4	43.4	44.4	44.34	39.3	5.04	0
05/27/09	105	77.6	65.5	54.5	49.4	47.4	54.5	44.4	41.3	45.35	39.3	6.05	0
05/28/09	105	95.8	78.7	62.5	53.4	47.4	54.5	45.4	42.4	44.35	38.3	6.05	0
05/29/09	82.7	92.8	92.8	84.7	60.5	49.4	53.4	46.4	43.4	45.35	39.3	6.05	0
05/30/09	67.6	79.7	88.7	98.8	75.6	59.5	54.5	47.4	43.4	46.35	40.3	6.05	0
05/31/09	58.5	65.5	75.6	90.8	82.7	66.6	57.5	47.4	44.4	44.35	38.3	6.05	0
06/01/09	53.4	57.5	70.6	79.7	78.7	76.6	64.5	47.4	41.3	48.45	42.4	6.05	0
06/02/09	53.4	52.4	64.5	67.6	69.6	84.7	71.6	48.4	44.4	49.44	44.4	5.04	0
06/03/09	53.4	49.4	57.5	58.5	61.5	83.7	80.7	50.4	47.4	47.44	42.4	5.04	0
06/04/09	53.4	49.4	51.4	54.5	55.5	77.6	85.7	55.5	47.4	50.44	45.4	5.04	0
06/05/09	52.4	49.4	50.4	52.4	52.4	69.6	85.7	64.5	51.4	51.45	45.4	6.05	0
06/06/09	53.4	53.4	50.4	51.4	51.4	63.5	81.7	70.6	56.5	55.47	46.4	6.05	3.02
06/07/09	52.4	51.4	52.4	52.4	50.4	58.5	72.6	71.6	64.5	65.55	46.4	6.05	13.1
06/08/09	53.4	50.4	50.4	51.4	50.4	56.5	63.5	70.6	65.5	68.55	46.4	6.05	16.1
06/09/09	53.4	51.4	49.4	50.4	49.4	54.5	58.5	65.5	62.5	69.55	47.4	6.05	16.1
06/10/09	54.5	53.4	51.4	50.4	49.4	54.5	55.5	60.5	61.5	66.54	47.4	5.04	14.1
06/11/09	53.4	54.5	54.5	52.4	49.4	55.5	55.5	55.5	57.5	63.55	46.4	6.05	11.1
06/12/09	53.4	52.4	54.5	53.4	50.4	53.4	55.5	49.4	52.4	56.49	45.4	5.04	6.05
06/13/09	53.4	52.4	52.4	52.4	50.4	53.4	54.5	45.4	46.4	53.46	46.4	6.05	1.01
06/14/09	54.5	52.4	51.4	52.4	49.4	53.4	53.4	44.4	43.4	49.45	43.4	6.05	0
06/15/09	53.4	50.4	51.4	52.4	49.4	54.5	53.4	43.4	42.4	43.35	37.3	6.05	0
06/16/09	54.5	49.4	51.4	51.4	49.4	54.5	50.4	42.4	41.3	42.35	36.3	6.05	0

3.0 ASSESSMENT OF RIVER FLOW GAINS AND LOSSES

3.1. Executive Summary

This section describes river flow gains and losses for all reaches in the Lower Owens River from the Los Angeles Aqueduct (LAA) Intake to the Pumpback Station during the period of October 2008 to September 2009 (River Flows Figure 1). The Lower Owens River, over the time period evaluated, lost an average daily flow of approximately 12 cfs (cubic feet per second). This loss equaled 20% of the flow released at the Intake.

Gains and losses vary seasonally. During the winter period (December 2008 to March 2009) the Lower Owens River increased its flow from the Intake downstream to the Pumpback Station by 3 cfs. During the summer period (June 2009 through September 2009) the river lost 27 cfs by the time it reached the Pumpback Station. This demonstrates the effect that seasonal evapotranspiration and hydraulic loss or gain to the shallow groundwater table have on gains and losses in the system at any given time.

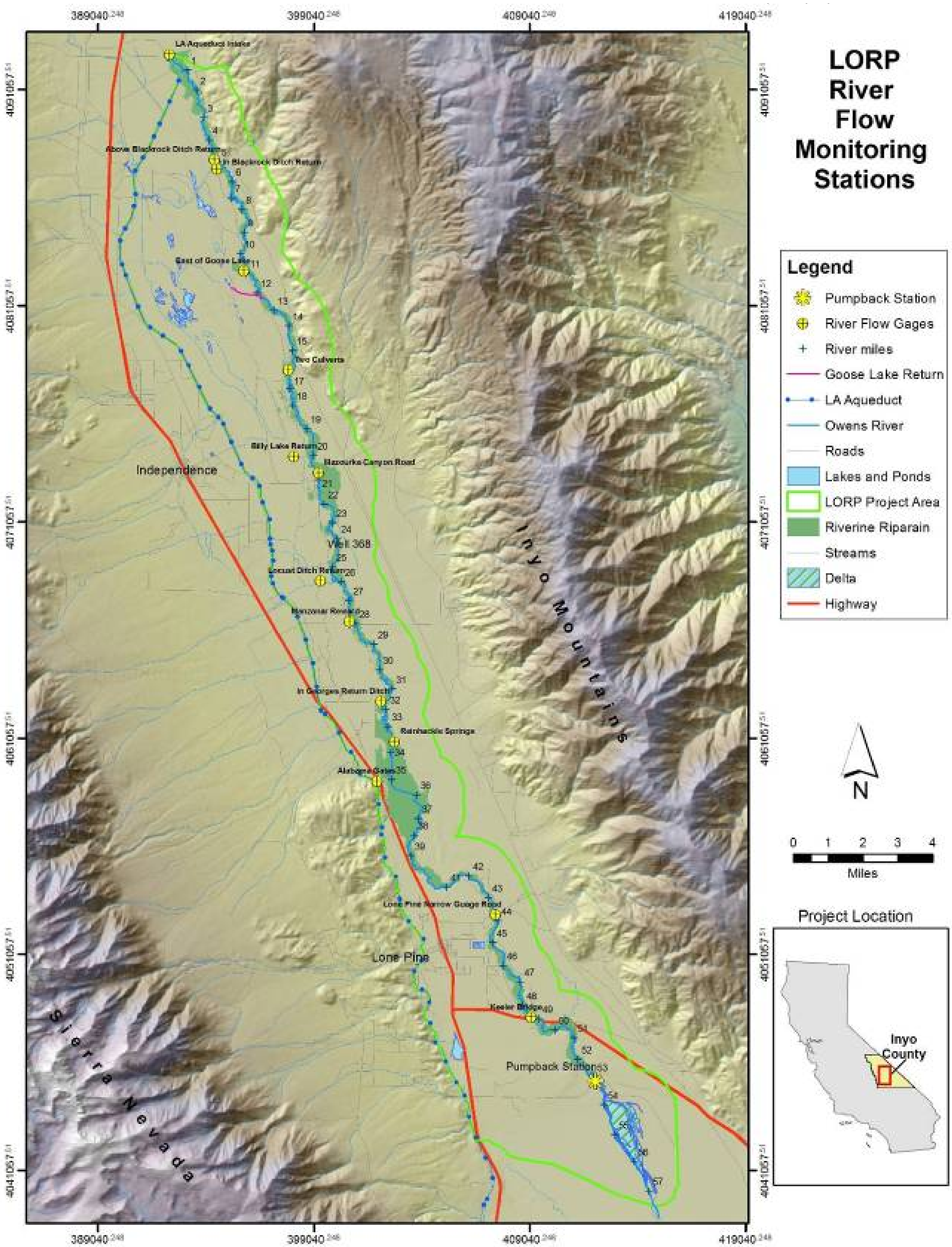
The recent year being reviewed in this chapter shows decreased losses in the river compared to the December 2006 to September 2008. The river lost 12 cfs on average for the year, compared to a loss of 18 cfs on average for the first year and a half of operations. Also, the amount of water lost as a percentage of released flows (Intake and augmentations) dropped from 26% to 20%. The lower losses are likely the result of less water being hydraulically lost to the shallow groundwater table as the shallow aquifer fills, although it is unclear whether the lower loss trend will continue or has stabilized since the seasonal evapotranspiration rate may increase with an increase in riparian vegetation.

3.2. Introduction

Flows in the Lower Owens River and its tributaries, including return ditches, are monitored by LADWP's automatic and manual metering sites. At the beginning of the time period covered in this report there were ten different gaging stations on the Lower Owens River. The ten gaging stations include: the Intake, Blackrock, Goose, Two Culverts, Mazourka, Manzanar, Reinhackle, Lone Pine, Keeler, and the Pumpback Station. In July 2009, Standing Committee designated the Intake, Mazourka, Reinhackle, and Pumpback Station as permanent flow monitoring sites, and the stations at Blackrock, Goose, Two Culverts, Manzanar, Lone Pine, and Keeler were removed from service so much of the analysis in this chapter focuses on the remaining four designated permanent stations. The reaches referred to in this report indicate areas of river between specified permanent gaging stations. LADWP maintains the metering equipment, manages the measured flow data and verifies the accuracy of flow measurements that are used in this assessment.

An average base flow of 56 cfs in the Lower Owens River (to gain approximately 40 cfs total flow from the Intake to the Pumpback Station, as required by stipulation), was released during the water year 2009 of October 2008 to September 2009. A seasonal habitat flow was initiated in the Lower Owens River from the Intake to the Pumpback Station in late May and early June 2009. The habitat flows were released and gradually ramped up, over a period of days, starting on May 24, 2009. Flow releases ramped up from 48 cfs to 110 cfs at the Intake. The data documenting these releases and resulting flows are recorded by date, flow, and gaging station (River Flows Appendix 3A).

This section describes and displays the temporal patterns of water losses and gains in the Lower Owens River as it flows downriver between the Intake and the Pumpback Station. This analysis is an attempt at understanding flow losses and gains in the Lower Owens River so that estimates of future water requirements can be made.

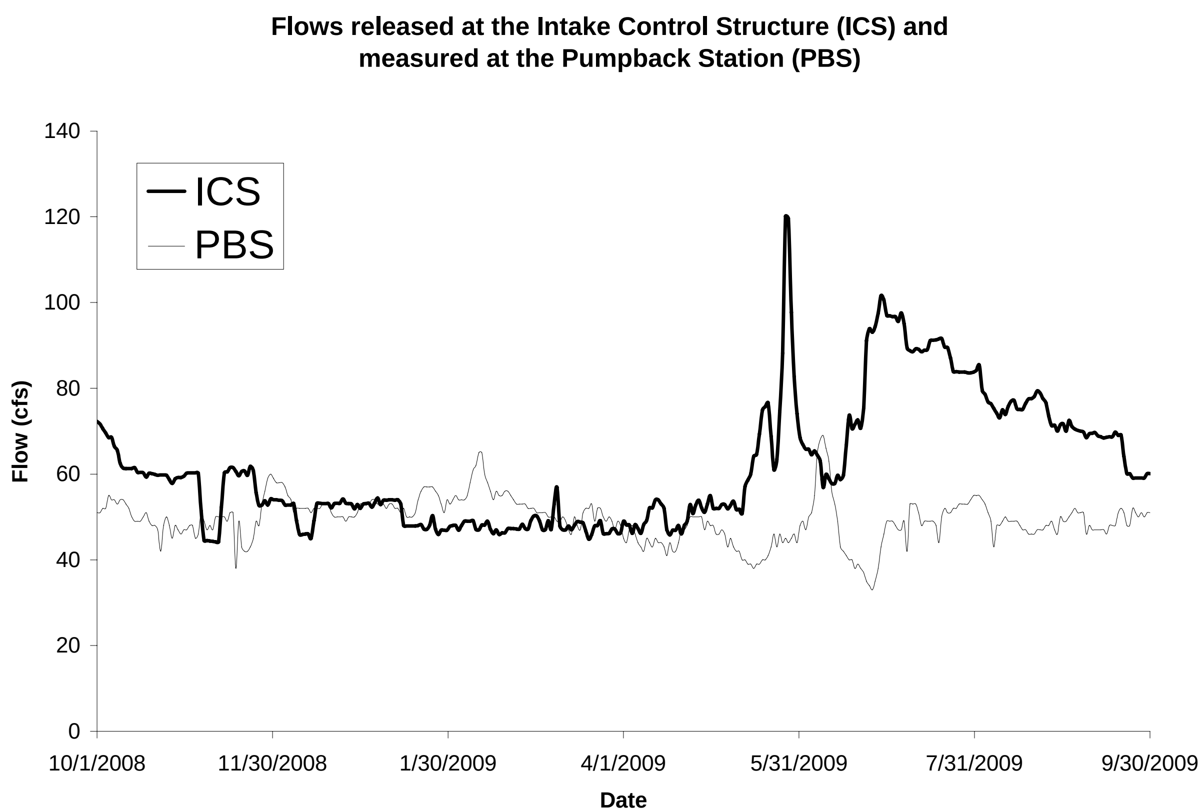


River Flows Figure 1. LORP River Flow Monitoring Stations

3.3. River Flow Loss or Gain by Month and Year

Flow losses or gains by river reach differ over time and reach (River Flows Tables 1 and Figure 2). Evaporation-transpiration (ET) rates fall sharply during late fall and winter and increase dramatically during the spring-summer plant growing seasons. Thus, a river reach can lose water to ET during certain periods of the year and maintain or gain water during other periods of the year. Similarly, due to differences in shallow aquifer water levels adjacent to the river channel, some reaches can lose water while other river reaches can gain water during any period of the year. December through March are winter periods with low ET that result in gains from increased flows from water stored in the shallow aquifer where groundwater levels are higher than adjacent river levels. Other incoming winter water sources such as local sporadic runoff from storms could also result in flow increases for specific reaches.

The flow losses for May and June 2009 were influenced by the habitat flows so may not be typical for predicting future losses.



River Flows Figure 2. Flows Released at Intake + Augmentation vs. Flows at Pumpback Station

For the entire river, the overall gain or loss is calculated by subtracting Pumpback Station outflow from inflows from the Intake and augmentation spillgates. Inflows from the Intake were 40,520 acre-feet, inflows from augmentation spillgates were 3,950 acre-feet, and outflows from the Pumpback Station were 35,750 acre-feet. This yields a loss of 8,720 acre-feet for the year, a daily average of approximately 12 cfs between the Intake and the Pumpback Station. Water loss during the 2008-09 water year (October 2008 to September 2009) represents about 20% of the total released flow from the Intake into the river channel.

In the beginning stages of the LORP implementation (December 2006 through September 2007) the water losses were higher, averaging 18 cfs compared to 12 cfs, and water losses as a percentage of total released water dropped from 26% to 20%. The larger losses in the earlier period of the LORP likely resulted from water hydraulically lost by seepage into the shallow aquifer adjacent to the channel during the first year and a half of operations while in the most recent year it's likely the shallow aquifer adjacent to the LORP area is closer to an equilibrium level with the river.

River Flows Table 1. Average Monthly River Flow Losses or Gains from Intake to Pumpback Station During 2008 and 2009

	Month	Flow (cfs)	Acre-Feet-Per-Day
2008	OCT	-13	-25
	NOV	-7	-14
	DEC	+1	+2
2009	JAN	+3	+6
	FEB	+8	+17
	MAR	+2	+4
	APR	-4	-8
	MAY	-24*	-48
	JUN	-25*	-50
	JUL	-40	-78
	AUG	-27	-54
	SEP	-17	-34
	AVG MONTH	**-12 cfs**	**-24 AcFt**

** Data influenced by the spring flushing flow release*

3.3.1. Flow Loss or Gain by River Reach during the Winter Period

From December 2008 to March 2009, an average flow of 46 cfs was released into the Lower Owens River from the Intake. An additional 4 cfs was provided from augmentation ditches, for a total accumulated release of 50 cfs. The average flow that reached the Pumpback Station was 53 cfs, an increase of 3 cfs during this period. During the winter, ET is low and any "make water" coming into the river is additive. Part of the "make water" was probably stored during earlier periods in subsurface aquifers and also a result of higher winter period precipitation.

The river reach from the Intake to the Mazourka Canyon Road gaging station was a losing flow reach (-6 cfs) (even under winter conditions), while the reach from Mazourka Canyon Road to the Reinhackle gaging station gained 6 cfs and Reinhackle to the Pumpback Station gained 3 cfs (River Flows Table 2). A water "gaining" reach, during harsh winter conditions, can benefit an ecosystem in many ways. Incoming water, especially if it is subsurface, tends to increase winter river water temperatures, reduces icing effects, increases dissolved oxygen when water surface ice is melted by increasing the re-aeration rate, and adds nutrients.

River Flows Table 2. Winter Flow Losses or Gains, December 2008 to March 2009

Recording Station	Average Flow (cfs)	Gain or Loss (cfs)	Accumulative (cfs)
Intake*	46	N/A	N/A
Mazourka	44	-6	-6
Reinhackle	50	+6	+0
Pumpback	53	+3	+3

Note: All numbers are rounded to nearest whole value
* 2 cfs added at the Blackrock Return Ditch
1 cfs added at the Goose Return Ditch
1 cfs added at the Bill Lake Return Ditch

3.3.2. Flow Losses or Gains by River Reach During the Summer Period

During the summer period of June 2009 to September 2009, all river reaches lost water (River Flows Table 3). The effects of ET are evident by the high total flow loss (-27 cfs) from the Intake to the Pumpback Station. Summer flow losses were 30 cfs higher than winter flow losses. The largest flow losses occurred at the Reinhackle to the Pumpback Station reach (-11 cfs).

River Flows Table 3. Summer Flow Losses and Gains, June 2009 to September 2009

Recording Station	Average Flow (cfs)	Gain or Loss (cfs)	Accumulative (cfs)
Intake*	69	N/A	N/A
Mazourka**	66	-8	-8
Reinhackle***	60	-7	-15
Pumpback	49	-11	-27

Note: All numbers are rounded to nearest whole value
* The following augmentation stations are added
3 cfs added at the Blackrock Return Ditch
1 cfs added at the Goose Lake Return
1 cfs added at the Billy Lake Return
** The following augmentation station is added
1 cfs added at the Georges Ditch Return
*** The following augmentation station is added
0.4 cfs added at the Alabama Gates Return

3.4. Appendix River Flows Tables

River Flows Table 4. Lower Owens River Project River Flows from October 1, 2008 - September 30, 2009.

Flow Gaging Station / Date	Below River Intake	Above Blackrock	Blackrock Ditch Return	East of Goose Lake	Goose Lake Return	Two Culverts (5 Culverts)	Billy Lake Return	Mazourka Canyon Road	Locust Ditch Return	Manzanar Reward Road	Georges Ditch Return	Reinhackle Springs	Alabama Gates Return	LP at NG Rd	Keeler Bridge	At Pumpback Station	Pump Station	Langemann Gate to Delta	Weir to Delta	In Channel Avg Flow
10/1/2008	65	64	5.0	66	0.4	64	1.4	60	0.0	64	0.5	58	0.0	50	51	51	45	6.0	0.0	59.3
10/2/2008	66	64	4.0	64	0.4	63	1.3	60	0.0	64	0.0	58	0.0	51	52	51	45	6.0	0.0	59.3
10/3/2008	66	64	3.0	62	0.4	62	1.2	59	0.0	65	0.0	58	0.0	50	53	52	46	6.0	0.0	59.1
10/4/2008	66	61	2.0	60	0.4	60	1.2	58	0.0	64	0.0	59	0.0	49	51	52	45	6.0	1.0	58.0
10/5/2008	65	63	2.0	59	0.4	60	1.1	58	0.0	64	0.0	59	0.0	48	51	55	48	6.0	1.0	58.2
10/6/2008	64	63	3.0	60	0.4	60	1.2	57	0.0	63	0.0	58	0.0	48	51	54	48	6.0	0.0	57.8
10/7/2008	62	59	3.0	59	0.4	60	1.1	57	0.0	63	0.0	58	0.0	48	50	54	48	6.0	0.0	57.0
10/8/2008	61	57	3.0	53	0.4	59	1.1	56	0.0	61	0.0	58	0.0	49	50	53	47	6.0	0.0	55.7
10/9/2008	58	55	3.0	52	0.4	56	1.1	55	0.0	61	0.0	57	0.0	49	51	54	48	6.0	0.0	54.8
10/10/2008	57	50	3.0	48	0.4	55	1.0	52	0.0	59	0.0	57	0.0	48	49	54	48	6.0	0.0	52.9
10/11/2008	57	50	3.0	45	0.4	50	0.9	51	0.0	58	0.0	59	0.0	46	49	53	47	6.0	0.0	51.8
10/12/2008	57	50	3.0	45	0.4	49	0.9	49	0.0	57	0.0	58	0.0	45	48	52	46	6.0	0.0	51.0
10/13/2008	57	49	3.0	44	0.4	49	0.9	48	0.0	55	0.0	58	0.0	45	47	50	44	6.0	0.0	50.2
10/14/2008	57	47	3.0	44	0.4	49	1.1	48	0.0	55	0.0	56	0.0	45	47	49	43	6.0	0.0	49.7
10/15/2008	56	46	3.0	44	0.4	49	1.0	48	0.0	53	0.0	55	0.0	45	49	49	43	6.0	0.0	49.4
10/16/2008	57	49	2.0	49	0.4	48	1.0	47	0.0	56	0.0	53	0.0	45	48	49	43	6.0	0.0	50.1
10/17/2008	57	48	2.0	48	0.4	49	0.9	47	0.0	56	0.0	53	0.0	44	48	50	44	6.0	0.0	50.0
10/18/2008	56	46	2.0	48	0.4	48	0.9	47	0.0	55	0.0	53	0.0	44	48	51	45	6.0	0.0	49.6
10/19/2008	56	48	3.0	48	0.4	48	0.8	47	0.0	55	0.0	53	0.0	43	47	49	43	6.0	0.0	49.4
10/20/2008	57	47	2.0	48	0.4	48	0.7	46	0.0	55	0.0	53	0.0	43	47	48	42	6.0	0.0	49.2
10/21/2008	57	47	2.0	49	0.4	48	0.5	47	0.0	53	0.0	52	0.0	43	45	48	42	6.0	0.0	48.9
10/22/2008	57	47	2.0	47	0.4	48	0.3	46	0.0	51	0.0	53	0.0	42	46	47	41	6.0	0.0	48.4
10/23/2008	57	47	2.0	48	0.4	48	0.4	47	0.0	52	0.0	52	0.0	41	44	42	37	5.0	0.0	47.8
10/24/2008	57	52	2.0	49	0.4	48	0.4	47	0.0	52	0.0	48	0.0	41	45	48	41	4.0	3.0	48.7
10/25/2008	57	51	2.0	49	0.4	49	0.3	48	0.0	52	0.0	48	0.0	41	44	50	46	4.0	0.0	48.9
10/26/2008	56	52	2.0	50	0.4	49	0.3	48	0.0	53	0.0	48	0.0	41	44	48	44	4.0	0.0	48.9
10/27/2008	56	49	1.0	48	0.5	49	0.3	48	0.0	53	0.0	49	0.0	41	44	45	41	4.0	0.0	48.2
10/28/2008	57	47	1.0	50	0.5	48	0.4	48	0.0	53	0.0	49	0.0	41	44	48	44	4.0	0.0	48.5
10/29/2008	57	47	1.0	46	0.5	48	0.7	48	0.0	55	0.0	49	0.0	41	45	47	43	4.0	0.0	48.3
10/30/2008	57	47	1.0	47	0.5	48	0.7	48	0.0	53	0.0	49	0.0	42	45	46	42	4.0	0.0	48.2
10/31/2008	57	47	1.0	49	0.6	47	0.9	47	0.0	52	0.0	48	0.0	42	46	47	43	4.0	0.0	48.2

Notes:
Dark Grey cells indicate that measurements were estimated by LADWP staff due to technical problems.
These measurements are not on the main channel of the Owens River, therefore highlighted columns are not included in average calculations..

Flow Gaging Station / Date	Below River Intake	Above Blackrock	Blackrock Ditch Return	East of Goose Lake	Goose Lake Return	Two Culverts (5 Culverts)	Billy Lake Return	Mazourka Canyon Road	Locust Ditch Return	Manzanar Reward Road	Georges Ditch Return	Reinhackle Springs	Alabama Gates Return	LP at NG Rd	Keeler Bridge	At Pumpback Station	Pump Station	Langemann Gate to Delta	Weir to Delta	In Channel Average Flow
11/1/2008	57	53	2.0	50	0.5	48	0.7	47	0.0	52	0.0	49	0.0	42	46	47	43	4.0	0.0	49.1
11/2/2008	57	53	2.0	50	0.5	50	0.8	48	0.0	51	0.0	50	0.0	42	46	48	44	4.0	0.0	49.5
11/3/2008	57	52	2.0	51	0.5	50	0.8	49	0.0	52	0.0	49	0.0	43	45	48	44	4.0	0.0	49.6
11/4/2008	57	51	2.0	50	0.5	50	0.8	50	0.0	52	0.0	49	0.0	43	47	45	41	4.0	0.0	49.4
11/5/2008	57	49	2.0	46	0.5	51	0.7	49	0.0	55	0.0	49	0.0	42	45	46	42	4.0	0.0	48.9
11/6/2008	48	49	2.0	49	0.5	51	0.8	49	0.0	57	0.0	50	0.0	41	45	51	47	4.0	0.0	49.0
11/7/2008	41	41	2.0	50	0.5	51	1.0	49	0.0	57	0.0	50	0.0	44	46	49	45	4.0	0.0	47.8
11/8/2008	41	37	2.0	43	0.5	46	1.0	48	0.0	57	0.0	50	0.0	45	46	47	43	4.0	0.0	46.0
11/9/2008	41	36	2.0	40	0.5	43	0.9	44	0.0	56	0.0	52	0.0	47	47	48	44	4.0	0.0	45.4
11/10/2008	41	35	2.0	39	0.6	41	0.7	41	0.0	56	0.0	51	0.0	47	47	47	43	4.0	0.0	44.5
11/11/2008	41	36	2.0	39	0.6	40	0.6	40	0.0	52	0.0	50	0.0	47	48	50	46	4.0	0.0	44.3
11/12/2008	41	35	2.0	37	0.6	40	0.6	39	0.0	47	0.0	49	0.0	47	48	50	46	4.0	0.0	43.3
11/13/2008	49	36	2.0	38	0.6	40	0.6	39	0.0	45	0.0	47	0.0	48	49	50	46	4.0	0.0	44.1
11/14/2008	57	48	2.0	41	0.6	41	0.7	38	0.0	42	0.0	45	0.0	47	49	50	46	4.0	0.0	45.8
11/15/2008	57	50	2.0	51	0.6	47	0.9	39	0.0	42	0.0	43	0.0	46	48	49	45	4.0	0.0	47.2
11/16/2008	57	48	3.0	53	0.6	50	0.9	44	0.0	42	0.0	42	0.0	44	48	51	47	4.0	0.0	47.9
11/17/2008	57	47	3.0	52	0.6	50	0.9	47	0.0	43	0.0	39	0.0	42	47	51	47	4.0	0.0	47.5
11/18/2008	56	45	3.0	51	0.6	50	1.0	47	0.0	47	0.0	38	0.0	40	45	38	33	4.0	1.0	45.7
11/19/2008	56	48	2.0	53	0.6	50	1.0	47	0.0	51	0.0	38	0.0	39	43	49	45	4.0	0.0	47.4
11/20/2008	57	48	2.0	53	0.6	51	1.0	47	0.0	53	0.0	42	0.0	39	42	43	39	4.0	0.0	47.5
11/21/2008	57	48	2.0	53	0.6	51	1.1	47	0.0	53	0.0	44	0.0	39	42	42	38	4.0	0.0	47.6
11/22/2008	56	49	2.0	53	0.6	52	1.1	48	0.0	53	0.0	44	0.0	41	42	42	38	4.0	0.0	48.0
11/23/2008	57	49	3.0	53	0.6	52	1.1	48	0.0	53	0.1	45	0.0	43	43	43	39	4.0	0.0	48.6
11/24/2008	57	49	2.0	53	0.6	52	1.1	48	0.0	53	0.1	43	0.0	46	45	45	41	4.0	0.0	49.1
11/25/2008	52	49	2.0	57	0.5	52	1.1	49	0.0	55	0.1	43	0.0	47	47	49	45	4.0	0.0	50.0
11/26/2008	49	44	2.0	58	0.5	55	1.1	50	0.0	55	0.1	47	0.0	49	49	48	45	3.0	0.0	50.4
11/27/2008	49	42	2.0	51	0.5	51	1.2	50	0.0	56	0.1	48	0.0	53	53	53	45	3.0	5.0	50.6
11/28/2008	49	43	3.0	49	0.5	48	1.2	47	0.0	56	0.1	49	0.0	59	55	56	45	3.0	8.0	51.1
11/29/2008	48	40	3.0	49	0.5	48	1.2	45	0.0	55	0.1	49	0.0	57	59	59	45	3.0	11.0	50.9
11/30/2008	49	42	3.0	48	0.6	47	1.3	45	0.0	53	0.3	49	0.0	53	58	60	45	3.0	12.0	50.4

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12/1/2008	49	42	3.0	49	0.5	47	1.4	44	0.0	51	0.1	47	0.0	52	56	59	46	3.0	10.0	49.6
12/2/2008	49	42	3.0	49	0.5	48	1.4	45	0.0	50	0.1	47	0.0	53	52	58	47	3.0	8.0	49.3
12/3/2008	49	47	3.0	49	0.5	48	1.3	45	0.0	50	0.1	44	0.0	53	55	58	47	3.0	8.0	49.8
12/4/2008	49	45	3.0	48	0.5	48	1.2	45	0.0	46	0.1	43	0.0	52	53	58	47	3.0	8.0	48.7
12/5/2008	49	41	2.0	45	0.5	46	1.2	45	0.0	47	0.1	44	0.0	50	53	57	47	3.0	7.0	47.7
12/6/2008	49	41	2.0	44	0.5	46	1.2	44	0.0	47	0.1	44	0.0	49	51	55	47	3.0	5.0	47.0
12/7/2008	49	42	2.0	44	0.5	47	1.2	44	0.0	47	0.1	43	0.0	48	49	54	47	3.0	4.0	46.7
12/8/2008	49	44	2.0	44	0.8	47	1.2	44	0.0	46	0.1	44	0.0	48	50	51	47	2.0	2.0	46.7
12/9/2008	44	45	3.0	44	1.0	45	1.0	44	0.0	46	0.1	44	0.0	48	49	52	46	3.0	3.0	46.1
12/10/2008	41	40	3.0	43	1.0	45	0.9	43	0.0	42	0.0	48	0.0	48	49	52	46	3.0	3.0	45.1
12/11/2008	41	38	3.0	39	1.0	43	0.9	43	0.0	42	0.0	47	0.0	47	50	52	46	3.0	3.0	44.2
12/12/2008	41	39	3.0	38	1.0	41	1.0	41	0.0	43	0.0	48	0.0	47	49	52	46	3.0	3.0	43.9
12/13/2008	41	38	3.0	38	1.0	41	1.0	40	0.0	44	0.0	47	0.0	48	49	52	48	3.0	1.0	43.8
12/14/2008	41	37	2.0	37	1.0	40	1.0	39	0.0	43	0.0	47	0.0	47	48	51	47	3.0	1.0	43.0
12/15/2008	45	38	2.0	38	1.0	38	1.1	38	0.0	41	0.0	46	0.0	47	50	52	47	3.0	2.0	43.3
12/16/2008	49	43	2.0	40	1.0	40	1.1	38	0.0	41	0.0	46	0.0	48	51	52	47	3.0	2.0	44.8
12/17/2008	49	45	2.0	42	1.0	43	1.2	38	0.0	40	0.0	45	0.0	49	49	52	47	3.0	2.0	45.2
12/18/2008	49	45	2.0	43	1.0	45	1.1	40	0.0	39	0.0	44	0.0	48	50	53	47	3.0	3.0	45.6
12/19/2008	49	44	2.0	43	1.0	45	1.1	42	0.0	39	0.0	44	0.0	46	50	53	47	3.0	3.0	45.5
12/20/2008	49	44	2.0	43	1.0	45	1.1	42	0.0	41	0.0	45	0.0	45	49	53	47	3.0	3.0	45.6
12/21/2008	48	44	2.0	43	1.0	46	1.1	43	0.0	42	0.0	45	0.0	44	47	51	47	3.0	1.0	45.3
12/22/2008	49	45	2.0	46	1.0	46	1.1	44	0.0	43	0.0	46	0.0	44	46	50	47	3.0	0.0	45.9
12/23/2008	49	45	2.0	42	1.0	46	1.2	44	0.0	49	0.0	46	0.0	42	47	50	47	3.0	0.0	46.0
12/24/2008	49	45	2.0	44	1.0	45	1.2	44	0.0	49	0.0	46	0.0	43	46	50	47	3.0	0.0	46.1
12/25/2008	50	46	2.0	45	1.0	46	1.2	44	0.0	49	0.0	47	0.0	43	46	50	47	3.0	0.0	46.6
12/26/2008	49	45	2.0	45	1.0	47	1.2	44	0.0	50	0.0	48	0.0	44	48	49	46	3.0	0.0	46.9
12/27/2008	49	43	2.0	44	1.0	46	1.1	44	0.0	50	0.0	48	0.0	45	48	50	47	3.0	0.0	46.7
12/28/2008	49	43	2.0	43	1.0	45	1.0	43	0.0	49	0.0	48	0.0	45	49	50	47	3.0	0.0	46.4
12/29/2008	48	45	2.0	44	1.0	45	0.9	43	0.0	49	0.0	45	0.0	45	49	50	47	3.0	0.0	46.3
12/30/2008	49	43	2.0	44	1.0	43	0.9	43	0.0	49	0.0	46	0.0	45	49	51	47	3.0	1.0	46.2
12/31/2008	48	43	2.0	44	1.0	43	0.9	43	0.0	49	0.1	47	0.0	46	49	53	47	3.0	3.0	46.5

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1/1/2009	49	44	2.0	44	1.0	43	0.9	43	0.0	49	0.0	47	0.1	46	50	53	47	3.0	3.0	46.8
1/2/2009	49	44	2.0	44	1.0	43	0.9	43	0.0	49	0.0	47	0.2	47	49	53	47	3.0	3.0	46.8
1/3/2009	49	44	2.0	43	1.0	43	0.9	43	0.0	49	0.0	48	0.3	47	51	53	47	3.0	3.0	47.0
1/4/2009	48	43	2.0	43	1.0	43	0.9	43	0.0	49	0.0	47	0.4	46	49	54	47	3.0	4.0	46.5
1/5/2009	48	43	3.0	43	1.0	43	0.8	43	0.0	49	0.0	46	0.5	46	49	54	47	3.0	4.0	46.4
1/6/2009	49	43	3.0	42	1.0	42	0.9	43	0.0	49	0.0	46	0.5	45	48	53	47	3.0	3.0	46.0
1/7/2009	49	44	2.0	41	1.0	43	0.9	43	0.0	48	0.0	46	0.0	45	48	53	47	3.0	3.0	46.0
1/8/2009	50	44	2.0	41	1.0	43	0.9	42	0.0	49	0.0	53	0.0	45	48	53	47	3.0	3.0	46.8
1/9/2009	50	50	2.0	42	1.0	43	0.9	43	0.0	49	0.0	53	0.0	45	49	52	44	3.0	5.0	47.6
1/10/2009	50	52	2.0	47	1.0	47	1.0	43	0.0	49	0.0	53	0.0	45	49	53	46	3.0	4.0	48.8
1/11/2009	49	52	3.0	47	1.0	48	1.0	46	0.0	49	0.0	52	0.0	45	50	53	47	3.0	3.0	49.1
1/12/2009	49	50	3.0	46	1.0	49	0.9	48	0.0	48	0.0	53	0.0	44	48	52	47	3.0	2.0	48.7
1/13/2009	49	50	3.0	46	1.0	49	1.0	49	0.0	49	0.0	53	0.0	44	48	52	47	3.0	2.0	48.9
1/14/2009	48	50	3.0	46	1.0	49	1.0	49	0.0	56	0.0	53	0.0	45	48	51	41	3.0	7.0	49.5
1/15/2009	43	47	3.0	45	1.0	49	1.0	49	0.0	56	0.0	57	0.0	45	50	52	47	3.0	2.0	49.3
1/16/2009	43	43	3.0	43	1.0	46	0.9	50	0.0	56	0.0	57	0.0	45	49	50	46	3.0	1.0	48.2
1/17/2009	43	44	3.0	46	1.0	44	0.9	47	0.0	56	0.0	58	0.0	46	49	50	46	3.0	1.0	48.3
1/18/2009	43	44	3.0	46	1.0	44	0.9	45	0.0	56	0.0	57	0.0	46	49	50	46	3.0	1.0	48.0
1/19/2009	43	45	3.0	47	1.0	45	0.9	45	0.0	55	0.0	57	0.0	48	50	51	47	3.0	1.0	48.6
1/20/2009	43	45	3.0	47	1.0	45	1.0	46	0.0	53	0.0	57	0.0	49	51	54	47	3.0	4.0	49.0
1/21/2009	43	46	3.0	48	1.1	46	1.1	46	0.0	53	0.0	56	0.0	49	53	56	47	3.0	6.0	49.6
1/22/2009	42	45	3.0	48	1.1	46	1.1	46	0.0	53	0.0	55	0.0	50	53	57	47	3.0	7.0	49.5
1/23/2009	42	45	3.0	47	1.1	44	1.0	47	0.0	55	0.0	56	0.0	50	53	57	46	3.0	8.0	49.6
1/24/2009	43	45	3.0	46	1.1	44	1.0	46	0.0	53	0.0	55	0.0	49	53	57	47	3.0	7.0	49.1
1/25/2009	45	46	3.0	46	1.1	45	1.0	46	0.0	55	0.2	56	0.0	48	53	57	46	3.0	8.0	49.7
1/26/2009	43	46	2.0	46	1.1	45	1.0	46	0.0	55	0.0	56	0.0	48	53	56	47	3.0	6.0	49.4
1/27/2009	42	44	2.0	45	1.1	44	0.8	46	0.0	49	0.0	56	0.0	47	51	55	46	3.0	6.0	47.9
1/28/2009	43	44	2.0	44	1.1	44	0.8	45	0.0	48	0.0	56	0.0	47	51	53	47	3.0	3.0	47.5
1/29/2009	43	44	2.0	44	1.1	44	0.8	45	0.0	51	0.0	56	0.0	47	50	51	47	2.0	2.0	47.5
1/30/2009	43	45	2.0	44	1.1	44	0.8	45	0.0	51	0.0	56	0.0	47	49	54	47	3.0	4.0	47.8
1/31/2009	43	45	3.0	44	0.8	44	1.0	45	0.0	50	0.0	56	0.0	47	51	53	47	3.0	3.0	47.8

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2/1/2009	43	43	3.0	43	1.1	44	0.9	46	0.0	50	0.0	56	0.0	47	50	54	47	3.0	4.0	47.6
2/2/2009	43	44	3.0	42	1.1	43	0.9	45	0.0	50	0.0	56	0.0	47	51	55	47	3.0	5.0	47.6
2/3/2009	42	45	3.0	43	1.0	44	0.9	45	0.0	50	0.0	56	0.0	47	51	54	47	3.0	4.0	47.7
2/4/2009	43	45	3.0	43	1.0	44	1.0	45	0.0	52	0.0	55	0.0	47	51	54	47	3.0	4.0	47.9
2/5/2009	44	42	3.0	44	1.0	43	1.0	45	0.0	51	0.0	51	0.0	47	51	54	48	3.0	3.0	47.2
2/6/2009	45	42	2.0	45	1.0	44	1.0	46	0.0	51	0.0	53	0.0	47	51	55	40	3.0	12.0	47.9
2/7/2009	45	42	2.0	46	1.0	45	1.0	47	0.0	52	0.0	56	0.0	48	51	58	37	3.0	18.0	49.0
2/8/2009	44	43	3.0	47	1.0	46	1.1	48	0.0	55	0.0	56	0.0	52	57	61	46	3.0	12.0	50.9
2/9/2009	42	40	3.0	46	1.0	46	1.1	49	0.0	55	0.0	56	0.0	60	53	62	46	3.0	13.0	50.9
2/10/2009	42	38	3.0	43	1.0	44	1.0	48	0.0	55	0.0	56	0.0	59	60	65	46	3.0	16.0	51.0
2/11/2009	43	38	3.0	43	1.0	42	1.1	46	0.0	56	0.0	56	0.0	53	63	65	47	3.0	15.0	50.5
2/12/2009	43	38	3.0	44	1.0	42	1.1	45	0.0	56	0.0	57	0.0	49	60	60	47	3.0	10.0	49.4
2/13/2009	45	41	2.0	45	1.0	42	1.0	45	0.0	53	0.0	56	0.0	52	56	58	47	3.0	8.0	49.3
2/14/2009	43	40	2.0	46	1.0	41	1.1	44	0.0	52	0.0	56	0.0	52	55	56	45	3.0	8.0	48.5
2/15/2009	42	39	2.0	45	1.0	41	1.0	45	0.0	51	0.1	53	0.0	52	53	54	45	3.0	6.0	47.5
2/16/2009	43	39	2.0	45	1.0	40	0.9	44	0.0	51	0.1	53	0.0	52	53	56	47	3.0	6.0	47.6
2/17/2009	42	40	2.0	45	1.0	40	0.8	44	0.0	51	0.1	53	0.0	53	57	55	46	3.0	6.0	48.0
2/18/2009	42	39	2.0	45	1.1	41	1.1	44	0.0	51	0.1	53	0.0	55	55	55	46	3.0	6.0	48.0
2/19/2009	42	40	2.0	45	1.1	41	1.1	43	0.0	50	0.1	53	0.0	52	55	56	46	3.0	7.0	47.7
2/20/2009	43	41	2.0	46	1.1	41	1.1	43	0.0	50	0.1	53	0.0	51	56	56	46	3.0	7.0	48.0
2/21/2009	43	40	2.0	46	1.1	41	1.1	44	0.0	50	0.1	52	0.0	50	53	55	46	3.0	6.0	47.4
2/22/2009	43	41	2.0	46	1.1	41	1.1	44	0.0	50	0.1	53	0.0	50	51	54	46	3.0	5.0	47.3
2/23/2009	43	41	2.0	47	1.1	41	1.1	44	0.0	50	0.0	52	0.0	49	53	53	46	3.0	4.0	47.3
2/24/2009	43	42	2.0	46	1.1	41	1.1	45	0.0	50	0.0	52	0.0	49	53	53	47	3.0	3.0	47.4
2/25/2009	44	41	2.0	46	1.1	42	1.2	45	0.0	51	0.0	55	0.0	49	52	53	47	3.0	3.0	47.8
2/26/2009	43	41	2.0	44	1.1	46	1.2	45	0.0	51	0.0	55	0.0	49	52	53	47	3.0	3.0	47.9
2/27/2009	43	39	2.0	41	1.1	46	1.1	44	0.0	51	0.0	56	0.0	48	52	52	47	3.0	2.0	47.2
2/28/2009	45	39	2.0	40	1.0	44	1.2	44	0.0	51	0.0	56	0.0	48	51	52	47	3.0	2.0	47.0

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3/1/2009	46	42	2.0	42	1.1	44	1.1	43	0.0	51	0.0	55	0.0	48	52	52	47	3.0	2.0	47.5
3/2/2009	46	43	2.0	44	1.1	45	1.1	43	0.0	50	0.0	53	0.0	48	51	51	46	3.0	2.0	47.4
3/3/2009	45	43	2.0	46	1.0	46	1.0	45	0.0	49	0.0	51	0.0	48	52	51	46	3.0	2.0	47.6
3/4/2009	43	41	2.0	46	1.0	47	1.0	45	0.0	49	0.0	53	0.0	48	51	51	47	3.0	1.0	47.4
3/5/2009	43	39	2.0	43	1.0	46	1.1	45	0.0	50	0.0	48	0.0	47	51	51	46	3.0	2.0	46.3
3/6/2009	45	39	2.0	41	1.0	45	1.1	44	0.0	51	0.0	47	0.0	47	51	50	46	3.0	1.0	46.0
3/7/2009	43	41	2.0	42	1.0	44	1.0	43	0.0	51	0.1	48	0.0	46	50	50	47	3.0	0.0	45.8
3/8/2009	49	46	2.0	46	1.0	45	0.9	43	0.0	51	0.1	47	0.0	46	49	50	47	3.0	0.0	47.2
3/9/2009	53	50	2.0	50	1.0	48	0.9	44	0.0	49	0.0	47	0.0	47	50	49	46	3.0	0.0	48.7
3/10/2009	44	47	2.0	50	1.0	50	0.9	47	0.0	49	0.0	46	0.0	47	48	49	46	3.0	0.0	47.7
3/11/2009	43	46	2.0	49	1.0	50	1.0	49	0.0	48	0.0	46	0.0	45	50	50	47	3.0	0.0	47.6
3/12/2009	43	46	2.0	47	1.0	50	1.0	46	0.0	52	0.0	45	0.0	45	50	49	46	3.0	0.0	47.3
3/13/2009	44	46	2.0	47	1.0	49	0.9	45	0.0	55	0.0	46	0.0	44	49	47	44	3.0	0.0	47.2
3/14/2009	43	46	2.0	49	1.0	49	1.0	45	0.0	56	0.0	48	0.0	44	49	46	37	3.0	6.0	47.5
3/15/2009	44	45	2.0	48	1.0	48	1.0	45	0.0	56	0.0	49	0.0	44	49	50	45	3.0	2.0	47.8
3/16/2009	44	45	3.0	47	1.0	47	0.9	45	0.0	56	0.0	49	0.0	45	49	48	42	3.0	3.0	47.5
3/17/2009	44	45	3.0	47	1.0	48	0.8	44	0.0	57	0.0	49	0.0	47	49	47	42	3.0	2.0	47.7
3/18/2009	44	43	3.0	47	1.0	47	0.6	43	0.0	56	0.0	48	0.0	48	51	51	41	3.0	7.0	47.8
3/19/2009	43	41	2.0	45	1.0	45	0.7	43	0.0	56	0.0	48	0.0	48	52	52	46	3.0	3.0	47.3
3/20/2009	41	42	2.0	43	1.0	43	0.8	42	0.0	55	0.0	48	0.0	48	53	52	44	3.0	5.0	46.7
3/21/2009	42	42	2.0	45	1.0	44	0.9	41	0.0	55	0.0	48	0.0	49	52	53	43	3.0	7.0	47.1
3/22/2009	44	43	2.0	45	1.0	44	0.9	41	0.0	53	0.0	46	0.0	48	53	49	30	3.0	16.0	46.6
3/23/2009	45	44	1.0	44	1.0	45	1.0	41	0.0	52	0.0	46	0.0	48	52	52	36	3.0	13.0	46.9
3/24/2009	46	45	1.0	46	1.0	45	1.1	41	0.0	51	0.0	46	0.0	47	52	52	46	3.0	3.0	47.1
3/25/2009	43	45	1.0	47	1.0	45	1.1	42	0.0	51	0.0	46	0.0	46	51	50	40	3.0	7.0	46.6
3/26/2009	43	41	1.0	44	1.0	46	1.1	43	0.0	52	0.0	44	0.0	46	52	49	45	3.0	1.0	46.0
3/27/2009	43	41	1.0	42	1.0	44	1.2	42	0.0	52	0.0	44	0.0	45	50	50	43	3.0	4.0	45.3
3/28/2009	44	42	1.0	44	1.0	42	1.2	41	0.0	53	0.0	45	0.0	44	49	49	45	3.0	1.0	45.3
3/29/2009	44	42	1.0	43	1.0	44	1.2	40	0.0	53	0.0	47	0.0	44	49	47	41	3.0	3.0	45.3
3/30/2009	43	41	1.0	41	1.0	43	1.1	40	0.0	52	0.0	49	0.0	43	47	49	46	3.0	0.0	44.8
3/31/2009	43	43	1.0	43	0.9	42	1.1	40	0.0	51	0.3	48	0.0	43	47	48	45	3.0	0.0	44.8

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4/1/2009	45	43	2.0	42	1.1	45	0.9	40	0.0	51	0.0	46	0.0	43	48	45	42	3.0	0.0	44.8
4/2/2009	44	42	2.0	43	1.1	43	1.0	40	0.0	50	0.0	46	0.0	44	48	44	41	3.0	0.0	44.4
4/3/2009	44	42	2.0	41	1.1	45	1.0	41	0.0	51	0.0	46	0.0	43	49	47	44	3.0	0.0	44.9
4/4/2009	42	42	2.0	42	1.1	43	1.1	40	0.0	51	0.0	46	0.0	42	48	48	45	3.0	0.0	44.4
4/5/2009	44	41	2.0	41	1.1	43	1.1	40	0.0	51	0.0	47	0.0	41	47	46	43	3.0	0.0	44.1
4/6/2009	43	41	2.0	42	1.1	42	1.2	40	0.0	52	0.0	47	0.0	41	46	44	41	3.0	0.0	43.8
4/7/2009	43	40	1.0	39	1.0	40	1.2	40	0.0	51	0.0	45	0.0	41	46	43	40	3.0	0.0	42.8
4/8/2009	45	41	1.0	41	1.0	40	1.2	38	0.0	51	0.0	47	0.0	41	45	42	39	3.0	0.0	43.1
4/9/2009	45	42	2.0	42	1.0	40	1.2	41	0.0	51	0.0	47	0.0	44	47	45	42	3.0	0.0	44.4
4/10/2009	49	44	1.0	42	1.0	42	1.1	42	0.0	50	0.0	46	0.0	44	47	44	41	3.0	0.0	45.0
4/11/2009	49	55	1.0	46	1.1	44	1.0	43	0.0	50	0.0	45	0.0	44	48	43	40	3.0	0.0	46.7
4/12/2009	50	62	2.0	57	1.1	47	0.9	45	0.0	50	0.0	45	0.0	45	47	45	42	3.0	0.0	49.3
4/13/2009	50	62	2.0	62	1.1	51	0.9	49	0.0	51	0.0	44	0.0	45	47	44	41	3.0	0.0	50.5
4/14/2009	49	60	2.0	62	1.1	55	0.9	53	0.0	53	0.0	45	0.0	44	48	44	41	3.0	0.0	51.3
4/15/2009	48	57	2.0	58	1.1	57	0.9	55	0.0	56	0.0	45	0.0	44	48	43	40	3.0	0.0	51.1
4/16/2009	44	56	1.0	56	1.1	53	0.9	53	0.0	60	0.0	46	0.0	43	46	41	38	3.0	0.0	49.8
4/17/2009	42	51	2.0	55	1.0	51	0.8	52	0.0	62	0.0	50	0.0	43	45	44	41	3.0	0.0	49.5
4/18/2009	43	50	2.0	51	1.0	48	0.9	51	0.0	63	0.0	53	0.0	44	46	42	39	3.0	0.0	49.1
4/19/2009	43	50	2.0	51	1.0	45	0.9	50	0.0	62	0.0	52	0.0	47	48	42	39	3.0	0.0	49.0
4/20/2009	44	50	2.0	52	1.1	46	0.9	50	0.0	60	0.0	52	0.0	50	48	44	41	3.0	0.0	49.6
4/21/2009	43	49	1.0	51	1.1	45	0.9	49	0.0	59	0.0	52	0.0	52	52	47	44	3.0	0.0	49.9
4/22/2009	45	49	1.0	50	1.1	45	0.9	48	0.0	58	0.0	50	0.0	53	55	47	44	3.0	0.0	50.0
4/23/2009	45	50	2.0	51	1.1	45	0.9	48	0.0	57	0.0	50	0.0	53	56	48	45	3.0	0.0	50.3
4/24/2009	49	50	2.0	50	1.1	47	0.8	48	0.0	56	0.0	48	0.0	52	56	50	45	5.0	0.0	50.6
4/25/2009	47	51	2.0	48	1.1	47	0.7	48	0.0	56	0.0	47	0.0	50	53	50	45	5.0	0.0	49.7
4/26/2009	48	47	3.0	49	1.1	44	0.7	48	0.0	55	0.0	47	0.0	49	52	50	45	5.0	0.0	48.9
4/27/2009	49	48	3.0	49	1.1	43	0.8	48	0.0	53	0.0	47	0.0	48	51	50	44	6.0	0.0	48.6
4/28/2009	47	49	3.0	49	1.1	43	1.0	47	0.0	53	0.0	47	0.0	48	50	50	44	6.0	0.0	48.3
4/29/2009	46	47	3.0	49	1.1	43	1.0	47	0.0	53	0.0	47	0.0	48	50	47	41	6.0	0.0	47.7
4/30/2009	48	46	3.0	47	1.0	42	1.0	47	0.0	50	0.0	47	0.0	47	51	49	43	6.0	0.0	47.4

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5/1/2009	50	48	3.0	47	1.1	43	0.9	47	0.0	49	0.0	48	0.0	47	50	48	42	6.0	0.0	47.7
5/2/2009	48	47	2.0	47	1.1	45	0.9	46	0.0	49	0.0	48	0.0	47	50	48	43	5.0	0.0	47.5
5/3/2009	48	46	2.0	46	1.1	44	0.9	46	0.0	48	0.0	48	0.0	47	50	46	41	5.0	0.0	46.9
5/4/2009	48	46	2.0	46	1.1	43	0.9	46	0.0	47	0.0	48	0.0	46	49	46	41	5.0	0.0	46.5
5/5/2009	49	46	2.0	46	1.1	43	0.8	45	0.0	46	0.0	47	0.0	46	49	47	41	6.0	0.0	46.4
5/6/2009	49	47	2.0	46	1.0	43	0.9	45	0.0	46	0.0	46	0.0	45	48	46	40	6.0	0.0	46.1
5/7/2009	48	46	2.0	46	1.0	43	0.9	45	0.0	45	0.0	47	0.0	43	42	43	37	6.0	0.0	44.8
5/8/2009	49	43	2.0	44	0.9	42	0.8	42	0.0	44	0.0	46	0.0	41	43	45	40	5.0	0.0	43.9
5/9/2009	50	46	2.0	43	0.8	41	0.9	41	0.0	43	0.0	46	0.0	41	42	43	37	6.0	0.0	43.6
5/10/2009	48	46	2.0	45	0.8	41	0.9	40	0.0	43	0.0	46	0.0	40	41	42	37	5.0	0.0	43.2
5/11/2009	47	43	3.0	44	0.9	42	0.9	40	0.0	41	0.0	45	0.0	40	40	42	36	6.0	0.0	42.4
5/12/2009	45	42	3.0	41	0.9	42	0.9	40	0.0	40	1.0	46	0.0	39	40	40	34	6.0	0.0	41.5
5/13/2009	47	45	3.0	41	0.9	40	1.0	39	0.0	40	5.2	47	0.0	38	39	40	34	6.0	0.0	41.6
5/14/2009	48	48	3.0	44	0.9	39	1.1	38	0.0	39	5.6	49	0.0	37	38	39	34	5.0	0.0	41.9
5/15/2009	48	49	4.0	46	0.9	41	1.1	39	0.0	38	6.1	48	0.0	38	39	39	33	6.0	0.0	42.5
5/16/2009	48	52	6.0	49	0.9	43	1.1	40	0.0	37	8.1	50	0.0	39	38	38	32	6.0	0.0	43.4
5/17/2009	48	55	6.0	52	0.9	45	1.4	42	0.0	37	8.3	51	0.0	40	38	39	33	6.0	0.0	44.7
5/18/2009	49	49	5.0	55	0.9	47	1.4	44	0.0	38	8.4	49	4.6	40	39	39	33	6.0	0.0	44.9
5/19/2009	48	49	6.0	53	0.9	46	1.4	45	0.0	39	8.6	50	10.0	40	39	40	34	6.0	0.0	44.9
5/20/2009	48	50	7.0	55	1.0	46	1.3	46	0.0	42	8.4	51	10.0	40	40	40	34	6.0	0.0	45.8
5/21/2009	48	51	8.0	57	0.9	47	1.3	46	0.0	44	8.4	50	10.0	43	39	41	35	6.0	0.0	46.6
5/22/2009	48	52	6.0	58	0.9	48	1.3	47	0.0	44	7.9	49	4.7	44	42	43	37	6.0	0.0	47.5
5/23/2009	46	48	6.0	58	0.9	49	1.3	47	0.0	46	6.8	50	0.0	45	43	46	40	6.0	0.0	47.8
5/24/2009	48	50	6.0	53	0.9	48	1.3	48	0.0	46	7.2	52	0.0	45	43	43	38	5.0	0.0	47.6
5/25/2009	59	53	5.0	52	0.9	48	1.3	47	0.0	47	8.4	53	0.0	44	44	46	41	5.0	0.0	49.3
5/26/2009	73	63	5.0	57	0.9	49	1.4	47	0.0	48	7.9	53	0.0	43	44	44	39	5.0	0.0	52.1
5/27/2009	105	78	5.0	66	0.9	55	1.3	49	0.0	47	7.9	55	0.0	44	41	45	39	6.0	0.0	58.5
5/28/2009	105	96	5.0	79	0.9	63	1.0	53	0.0	47	7.7	55	0.0	45	42	44	38	6.0	0.0	62.9
5/29/2009	83	93	5.0	93	0.9	85	1.0	61	0.0	49	7.8	53	0.0	46	43	45	39	6.0	0.0	65.1
5/30/2009	68	80	5.0	89	0.9	99	0.9	76	0.0	60	7.9	55	0.0	47	43	46	40	6.0	0.0	66.3
5/31/2009	59	66	5.0	76	1.1	91	0.8	83	0.0	67	8.2	58	0.0	47	44	44	38	6.0	0.0	63.5

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6/1/2009	53	58	5.0	71	0.9	80	1.1	79	0.0	77	8.5	65	0.0	47	41	48	42	6.0	0.0	61.9
6/2/2009	53	52	3.0	65	0.9	68	1.4	70	0.0	85	8.6	72	0.0	48	44	49	44	5.0	0.0	60.6
6/3/2009	53	49	2.0	58	0.9	59	1.3	62	0.0	84	8.6	81	0.0	50	47	47	42	5.0	0.0	59.0
6/4/2009	53	49	2.0	51	0.9	55	1.3	56	0.0	78	8.6	86	0.0	56	47	50	45	5.0	0.0	58.1
6/5/2009	52	49	2.0	50	0.9	52	1.2	52	0.0	70	8.4	86	0.0	65	51	51	45	6.0	0.0	57.8
6/6/2009	53	53	2.0	50	0.9	51	1.1	51	0.0	64	8.4	82	0.0	71	57	55	46	6.0	3.0	58.7
6/7/2009	52	51	2.0	52	0.9	52	1.1	50	0.0	59	8.4	73	0.0	72	65	65	46	6.0	13.0	59.1
6/8/2009	53	50	2.0	50	0.9	51	1.1	50	0.0	57	6.0	64	0.0	71	66	68	46	6.0	16.0	58.0
6/9/2009	53	51	2.0	49	0.9	50	1.0	49	0.0	55	0.0	59	0.0	66	63	69	47	6.0	16.0	56.4
6/10/2009	55	53	3.0	51	0.9	50	1.0	49	0.0	55	0.0	56	0.0	61	62	66	47	5.0	14.0	55.8
6/11/2009	53	55	4.0	55	0.9	52	1.0	49	0.0	56	0.0	56	0.0	56	58	63	46	6.0	11.0	55.3
6/12/2009	53	52	3.0	55	0.9	53	0.9	50	0.0	53	0.0	56	0.0	49	52	56	45	5.0	6.0	52.9
6/13/2009	53	52	3.0	52	0.9	52	0.9	50	0.0	53	0.0	55	0.0	45	46	53	46	6.0	1.0	51.1
6/14/2009	55	52	3.0	51	0.9	52	0.8	49	0.0	53	0.0	53	0.0	44	43	49	43	6.0	0.0	50.1
6/15/2009	53	50	4.0	51	0.9	52	0.8	49	0.0	55	0.0	53	0.0	43	42	43	37	6.0	0.0	49.1
6/16/2009	55	49	3.0	51	0.9	51	0.8	49	0.0	55	0.0	50	0.0	42	41	42	36	6.0	0.0	48.5
6/17/2009	61	51	4.0	52	0.9	52	0.8	49	0.0	56	0.0	51	0.0	41	40	41	35	6.0	0.0	49.4
6/18/2009	68	67	4.0	56	0.9	51	0.8	50	0.0	56	0.0	52	0.0	42	41	40	34	6.0	0.0	52.3
6/19/2009	66	67	3.0	69	0.8	57	0.8	50	0.0	55	0.0	52	0.0	41	41	40	34	6.0	0.0	53.8
6/20/2009	68	65	2.0	71	0.8	61	0.8	55	0.0	53	0.0	51	0.0	41	40	38	33	5.0	0.0	54.3
6/21/2009	69	67	2.0	71	0.8	62	0.8	59	0.0	53	0.0	52	0.0	39	39	39	33	6.0	0.0	55.0
6/22/2009	67	68	2.0	72	0.8	63	0.9	59	0.0	57	0.0	51	0.0	38	39	38	32	6.0	0.0	55.2
6/23/2009	68	65	3.0	67	1.0	62	1.0	60	0.0	61	2.5	53	0.0	37	39	37	31	6.0	0.0	54.9
6/24/2009	74	66	4.0	67	1.1	64	1.0	61	0.0	62	6.6	59	4.4	37	37	35	30	5.0	0.0	56.2
6/25/2009	73	72	2.0	70	0.9	69	1.0	61	0.0	62	7.0	62	10.0	36	38	34	28	6.0	0.0	57.7
6/26/2009	72	72	2.0	76	0.8	70	1.0	62	0.0	63	7.3	61	10.0	39	37	33	28	5.0	0.0	58.5
6/27/2009	74	71	1.0	76	0.8	72	1.1	64	0.0	64	7.5	62	10.0	44	39	35	29	6.0	0.0	60.1
6/28/2009	77	72	1.0	76	0.8	73	1.1	65	0.0	66	7.6	63	10.0	48	42	38	32	6.0	0.0	62.0
6/29/2009	81	73	1.0	77	0.8	74	1.1	65	0.0	67	7.7	65	10.0	50	46	43	37	6.0	0.0	64.1
6/30/2009	85	78	2.0	80	0.9	74	1.3	66	0.0	69	7.8	66	3.6	52	49	46	40	6.0	0.0	66.5

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7/1/2009	85	81	2.0	87	0.8	77	1.1	67	0.0	69	8.1	67	0.0	53	49	49	43	6.0	0.0	68.4
7/2/2009	85	82	2.0	87	0.8	81	1.0	69	0.0	70	8.1	66	0.0	53	50	49	43	6.0	0.0	69.2
7/3/2009	85	84	2.0	87	0.7	83	0.9	72	0.0	71	8.1	67	0.0	51	51	49	43	6.0	0.0	70.0
7/4/2009	85	83	2.0	87	0.7	83	0.9	74	0.0	72	8.1	67	0.0	50	48	48	43	5.0	0.0	69.7
7/5/2009	85	83	1.0	87	0.7	84	0.8	75	0.0	74	8.1	68	0.0	50	48	47	41	6.0	0.0	70.1
7/6/2009	85	83	3.0	85	0.7	83	0.8	76	0.0	77	8.1	71	0.0	51	49	47	41	6.0	0.0	70.7
7/7/2009	85	83	3.0	81	0.8	83	0.7	75	0.0	79	5.6	73	0.0	52	50	49	44	5.0	0.0	71.0
7/8/2009	84	81	3.0	78	0.9	83	0.7	75	0.0	80	0.8	70	0.0	55	49	42	33	5.0	4.0	69.7
7/9/2009	83	79	3.0	80	0.9	83	0.5	74	0.0	80	1.4	68	0.0	56	50	53	47	6.0	0.0	70.6
7/10/2009	83	81	3.0	82	1.0	81	0.4	74	0.0	80	1.1	68	0.0	55	53	53	47	6.0	0.0	71.0
7/11/2009	85	83	2.0	87	1.0	81	0.4	72	0.0	81	0.8	66	0.0	52	52	53	47	6.0	0.0	71.2
7/12/2009	84	83	3.0	78	1.1	82	0.3	72	0.0	80	0.7	67	0.0	52	50	51	45	6.0	0.0	69.9
7/13/2009	85		2.0		1.0		0.5	74	0.0		0.0	67	0.0			48	42	6.0	0.0	68.5
7/14/2009	85		2.0		1.0		0.9	75	0.0		0.0	65	0.0			49	44	5.0	0.0	68.5
7/15/2009	85		2.0		0.9		1.1	76	0.0		0.0	62	0.0			49	43	6.0	0.0	68.0
7/16/2009	85		4.0		0.9		1.2	77	0.0		0.0	62	0.0			49	44	5.0	0.0	68.3
7/17/2009	85		4.0		0.9		1.3	78	0.0		0.0	62	0.0			49	43	6.0	0.0	68.5
7/18/2009	85		4.0		0.9		1.4	77	0.0		0.0	62	0.0			48	42	6.0	0.0	68.0
7/19/2009	85		4.0		1.1		1.4	78	0.0		0.0	63	0.0			44	39	5.0	0.0	67.5
7/20/2009	85		4.0		1.1		1.5	79	0.0		0.0	65	0.0			50	44	6.0	0.0	69.8
7/21/2009	82		4.0		1.2		2.4	80	0.0		0.0	66	0.0			52	47	5.0	0.0	70.0
7/22/2009	82		4.0		1.1		2.4	82	0.0		0.0	67	0.0			51	45	6.0	0.0	70.5
7/23/2009	81		4.0		1.0		1.1	80	0.0		0.0	67	0.0			51	45	6.0	0.0	69.8
7/24/2009	79		3.0		0.9		1.0	80	0.0		0.0	66	0.0			52	46	6.0	0.0	69.3
7/25/2009	79		3.0		0.9		1.0	80	0.0		0.0	65	0.0			52	46	6.0	0.0	69.0
7/26/2009	79		3.0		0.9		0.9	78	0.0		0.0	67	0.0			53	47	6.0	0.0	69.3
7/27/2009	79		3.0		0.9		0.9	75	0.0		0.0	66	0.0			53	47	6.0	0.0	68.3
7/28/2009	79		3.0		0.9		0.9	74	0.0		0.0	67	0.0			53	47	6.0	0.0	68.3
7/29/2009	79		3.0		0.8		0.8	73	0.0		0.0	66	0.0			53	47	6.0	0.0	67.8
7/30/2009	79		3.0		0.8		0.8	73	0.0		0.0	65	0.0			54	47	6.0	1.0	67.8
7/31/2009	79		3.0		1.0		0.8	72	0.0		0.0	65	0.0			55	47	6.0	2.0	67.8

Notes: Dark grey cells indicate that measurements were estimated by LADWP staff due to technical problems.
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Flow Gaging Station / Date	Below River Intake	Above Blackrock	Blackrock Ditch Return	East of Goose Lake	Goose Lake Return	Two Culverts (5 Culverts)	Billy Lake Return	Mazourka Canyon Road	Locust Ditch Return	Manzanar Reward Road	Georges Ditch Return	Reinhackle Springs	Alabama Gates Return	LP at NG Rd	Keeler Bridge	At Pumpback Station	Pump Station	Langemann Gate to Delta	Weir to Delta	In Channel Average Flow
8/1/2009	79		3.0		1.1		1.1	73	0.0		0.0	62	0.0			55	48	5.0	2.0	67.3
8/2/2009	79		4.0		1.3		1.1	73	0.0		0.0	62	0.0			55	48	6.0	1.0	67.3
8/3/2009	73		4.0		1.4		1.1	72	0.0		0.0	61	0.0			54	47	6.0	1.0	65.0
8/4/2009	72		4.0		1.5		1.0	72	0.0		0.1	60	0.0			53	47	6.0	0.0	64.3
8/5/2009	71		3.0		1.5		1.0	72	0.0		0.3	62	0.0			51	46	5.0	0.0	64.0
8/6/2009	71		3.0		1.3		1.0	71	0.0		0.1	62	0.0			49	43	6.0	0.0	63.3
8/7/2009	71		2.0		1.2		0.9	69	0.0		0.2	61	0.0			43	38	5.0	0.0	61.0
8/8/2009	70		2.0		1.1		0.7	68	0.0		0.4	62	0.0			48	42	6.0	0.0	62.0
8/9/2009	69		2.0		1.1		0.6	67	0.0		0.4	63	0.0			48	43	5.0	0.0	61.8
8/10/2009	70		3.0		1.1		0.5	67	0.0		0.4	63	0.0			49	43	6.0	0.0	62.3
8/11/2009	70		2.0		1.2		0.5	66	0.0		0.2	62	0.0			50	45	5.0	0.0	62.0
8/12/2009	72		2.0		1.2		0.6	66	0.0		0.0	60	0.0			49	44	5.0	0.0	61.8
8/13/2009	73		2.0		1.2		0.8	67	0.0		0.0	59	0.0			49	44	5.0	0.0	62.0
8/14/2009	72		3.0		1.2		1.0	68	0.0		0.0	59	0.0			49	44	5.0	0.0	62.0
8/15/2009	70		3.0		1.1		1.1	69	0.0		0.0	60	0.0			49	43	6.0	0.0	62.0
8/16/2009	70		3.0		1.1		1.0	68	0.0		0.0	58	0.0			48	43	5.0	0.0	61.0
8/17/2009	70		3.0		1.1		1.0	68	0.0		0.0	59	0.0			47	42	5.0	0.0	61.0
8/18/2009	71		3.0		1.1		1.4	68	0.0		0.0	59	0.0			47	41	6.0	0.0	61.3
8/19/2009	71		3.0		1.2		2.3	67	0.0		0.0	59	0.0			46	40	6.0	0.0	60.8
8/20/2009	71		3.0		1.1		2.5	67	0.0		0.0	58	0.0			46	41	5.0	0.0	60.5
8/21/2009	72		3.0		1.0		2.1	67	0.0		0.0	58	0.0			46	41	5.0	0.0	60.8
8/22/2009	73		4.0		0.8		1.6	67	0.0		0.0	58	0.0			47	41	6.0	0.0	61.3
8/23/2009	73		4.0		0.8		1.1	68	0.0		0.0	59	0.0			47	42	5.0	0.0	61.8
8/24/2009	73		3.0		0.8		0.8	72	0.0		0.0	59	0.0			47	42	5.0	0.0	62.8
8/25/2009	72		3.0		1.0		0.6	74	0.0		0.0	58	0.0			48	43	5.0	0.0	63.0
8/26/2009	69		3.0		1.0		0.5	73	0.0		0.0	57	0.0			48	43	5.0	0.0	61.8
8/27/2009	67		3.0		1.1		0.2	71	0.0		0.0	59	0.0			49	43	6.0	0.0	61.5
8/28/2009	67		3.0		1.2		0.2	71	0.0		0.0	60	0.0			47	42	5.0	0.0	61.3
8/29/2009	65		3.0		1.2		0.8	70	0.0		0.0	59	0.0			46	40	6.0	0.0	60.0
8/30/2009	66		3.0		1.2		1.3	69	0.0		0.0	60	0.0			50	44	6.0	0.0	61.3
8/31/2009	67		2.0		1.2		1.5	68	0.0		0.0	60	0.0			49	43	6.0	0.0	61.0

Notes: Dark grey cells indicate that measurements were estimated by LADWP staff due to technical problems.
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Flow Gaging Station / Date	Below River Intake	Above Blackrock	Blackrock Ditch Return	East of Goose Lake	Goose Lake Return	Two Culverts (5 Culverts)	Billy Lake Return	Mazourka Canyon Road	Locust Ditch Return	Manzanar Reward Road	Georges Ditch Return	Reinhackle Springs	Alabama Gates Return	LP at NG Rd	Keeler Bridge	At Pumpback Station	Pump Station	Langemann Gate to Delta	Weir to Delta	In Channel Average Flow
9/1/2009	65		2.0		1.0		2.0	68	0.0		0.0	60	0.0			49	43	6.0	0.0	60.5
9/2/2009	66		3.0		1.0		2.2	67	0.0		0.3	60	0.0			50	43	7.0	0.0	60.8
9/3/2009	65		3.0		1.0		1.7	66	0.0		0.4	59	0.0			51	45	6.0	0.0	60.3
9/4/2009	66		2.0		1.0		1.3	66	0.0		0.2	59	0.0			52	46	6.0	0.0	60.8
9/5/2009	66		2.0		1.0		1.2	66	0.0		0.0	59	0.0			51	45	6.0	0.0	60.5
9/6/2009	66		2.0		1.0		1.0	66	0.0		0.0	57	0.0			51	45	6.0	0.0	60.0
9/7/2009	66		2.0		1.0		0.8	66	0.0		0.0	57	0.0			51	45	6.0	0.0	60.0
9/8/2009	65		2.0		1.0		0.5	66	0.0		0.0	53	0.0			46	29	17.0	0.0	57.5
9/9/2009	66		2.0		1.0		0.4	66	0.0		0.0	53	0.0			48	23	25.0	0.0	58.3
9/10/2009	66		2.0		1.0		0.5	66	0.0		0.0	53	0.0			47	22	25.0	0.0	58.0
9/11/2009	66		2.0		1.0		0.7	67	0.0		0.0	53	0.0			47	22	25.0	0.0	58.3
9/12/2009	65		2.0		1.0		0.9	67	0.0		0.0	51	0.0			47	22	25.0	0.0	57.5
9/13/2009	65		2.0		1.0		0.7	67	0.0		0.0	51	0.0			47	22	25.0	0.0	57.5
9/14/2009	65		2.0		1.0		0.4	67	0.0		0.0	50	0.0			47	22	25.0	0.0	57.3
9/15/2009	65		2.0		1.0		0.6	66	0.0		0.0	53	0.0			46	21	25.0	0.0	57.5
9/16/2009	65		2.0		1.0		0.7	66	0.0		0.0	52	0.0			48	23	25.0	0.0	57.8
9/17/2009	65		2.0		1.0		0.7	66	0.0		0.0	51	0.0			48	23	25.0	0.0	57.5
9/18/2009	66		2.0		1.0		0.8	67	0.0		0.0	51	0.0			48	32	16.0	0.0	58.0
9/19/2009	65		2.0		1.0		1.0	67	0.0		0.0	52	0.0			51	46	5.0	0.0	58.8
9/20/2009	65		2.0		1.0		1.1	67	0.0		0.0	52	0.0			52	46	6.0	0.0	59.0
9/21/2009	60		2.0		1.0		1.1	67	0.0		0.0	53	0.0			51	46	5.0	0.0	57.8
9/22/2009	56		2.0		1.0		1.1	66	0.0		0.0	53	0.0			48	42	6.0	0.0	55.8
9/23/2009	56		2.0		1.0		1.1	62	0.0		0.0	53	0.0			49	43	5.0	1.0	55.0
9/24/2009	56		1.0		1.0		1.1	60	0.0		0.0	53	0.0			52	47	5.0	0.0	55.3
9/25/2009	56		1.0		1.0		1.1	58	0.0		0.0	55	0.0			51	45	6.0	0.0	55.0
9/26/2009	56		1.0		1.0		1.1	56	0.0		0.0	54	0.0			50	44	6.0	0.0	54.0
9/27/2009	56		1.0		1.0		1.1	56	0.0		0.0	54	0.0			51	45	6.0	0.0	54.3
9/28/2009	56		1.0		1.0		1.1	56	0.0		0.0	52	0.0			50	45	5.0	0.0	53.5
9/29/2009	56		2.0		1.0		1.1	55	0.0		0.0	54	0.0			51	46	5.0	0.0	54.0
9/30/2009	56		2.0		1.0		1.1	55	0.0		0.0	54	0.0			51	46	5.0	0.0	54.0

Notes: These measurements are not on the main channel of the Owens River, therefore highlighted columns are not included in average calculations.

4.0 2009 RAPID ASSESSMENT SURVEY REPORT

The 2009 Rapid Assessment Survey (RAS) of the LORP area was a collaborative effort by the LADWP and ICWD. The 2009 RAS was conducted as year two monitoring of the post-implementation phase of the LORP.

LADWP and ICWD staff worked cooperatively with Ecosystems Sciences (ES) in any modification of protocols, field planning, and the conduction of field work during the 2009 season. The data entry, data proofing and data management were conducted by ICWD. LADWP prepared a draft report which was reviewed by ICWD. LADWP and ICWD prepared this final draft which was sent to ES for comment.

4.1. Introduction

The RAS is being conducted in the LORP area in order to identify problems that may require mitigation or an adaptive management response. The intent of annual RAS is to identify problems during intervals between monitoring years and between monitoring sites before they manifest themselves into large, more expensive management problems. The RAS also provides qualitative feedback regarding changes within the project area. The RAS will allow the early detection of such problems such as noxious weed infestations, which will then allow for prompt management intervention. The results of the rapid assessment survey will be used primarily to alert project managers to areas of special concern or land use impacts that may not be compatible with the goals of the LORP. This information can then be used to assess the need for further evaluation, contingency monitoring or adaptive management actions.

The Lower Owens River Monitoring and Adaptive Management Plan (MAMP) (Ecosystem Sciences, 2008) states that RAS will be performed once a year for the first 10 years following project implementation. After 10 years, the need to continue RAS into the future will be assessed.

Flows in the LORP were initiated in December 2006. Following a period of ramping and flow stabilization, the management goal of an average of 40 cfs throughout the river channel was certified by Inyo County Superior Court in July 2007. The first LORP seasonal habitat flow occurred from mid-February to early March 2008. The second LORP seasonal habitat flow occurred in May 2009. As discussed in the hydrology section of this report, 2009 was an unusually cool and dry year.

In 2007, a LORP RAS was conducted primarily as a pilot project. The 2008 RAS was considered year one of post-implementation monitoring and the 2009 RAS is considered year two of post-implementation monitoring.

Impacts that were assessed during the rapid assessment survey included, but were not limited to: the presence, establishment or spread of noxious weeds, the presence of roads resulting in excessive impacts or access to sensitive habitats, damaged livestock fences, or beaver activity. Areas of new riparian woody recruitment were also noted as recruitment of riparian vegetation is an important component of a healthy, functioning riparian system.

4.2. Survey Areas

The RAS protocol was conducted in the four LORP management areas: the Riverine-Riparian Management Area, the Blackrock Waterfowl Management Area (BWMA), the Delta Habitat Area (DHA), and Off-River Lakes and Ponds. Maps 1 and 2 in Appendix 1 show the location of general LORP features and management areas. In the Riverine-Riparian Management Area, surveys followed both sides of the Owens River from the margin of the water to the outer edge of the floodplain. In the BWMA, DHA, and Off-River Lakes and Ponds surveys circumnavigated ponds and flooded areas or traversed wetland habitats. All surveys were on foot, except as noted below. Further description of the survey areas can be found below.

Riverine-Riparian Management Area

The LORP Riverine-Riparian area follows the Owens River from the Los Angeles Aqueduct (LAA) Intake in the north to the Pumpback Station at the north end of the DHA to the south. The Riverine-Riparian area encompasses 6,437 acres and follows approximately 53 miles of the Lower Owens River channel. The east and west boundaries of the Riverine-Riparian area generally correspond to the river terrace boundary of the primary floodplain. In the Riverine-Riparian Management Area, the RAS followed both sides of the entire Lower Owens River channel from the Intake to the Pumpback Station. Surveys were conducted in floodplain areas on both the west and east sides of the river but did not extend beyond the outer edge of the floodplain.

Blackrock Waterfowl Management Area

The BWMA is located south of the Intake and lies between the LAA to the west, and the Owens River to the east. The BWMA encompasses 1,987 acres and consists of four management units: Drew, Thibaut, Waggoner, and Winterton. The BWMA contains upland habitats as well as the managed wetland units that will undergo periodic wetting and drying cycles designed to create suitable habitats for waterfowl and shorebirds. Although not all units will be flooded each year, management problems may arise during a drying period, and therefore, all units are surveyed when conducting RAS. Because the extent of flooding in each unit will vary yearly, the exact route followed will also vary. In general, surveys followed the wetted perimeter or traversed areas subjected to periodic wetting and drying. BWMA areas that are not subject to periodic managed flooding events were not surveyed as part of the RAS.

Off-River Lakes and Ponds

The Off-River Lakes and Ponds component of the LORP is composed of a series of small lakes and ponds primarily situated along the Owens Valley fault line, and within the vicinity of the BWMA. Many of the lakes and ponds are recreational fishery locations. Thibaut Ponds, which are considered part of the Off-River Lakes and Ponds, are contained wholly within the Thibaut Management and will be surveyed as part of the Thibaut Unit as described under the BWMA section. Other Off-River Lakes and Ponds include Upper and Lower Twin Lakes, the Coyote/Grass Lakes complex, Upper and Lower Goose Lake and Billy Lake. Under the LORP, water levels in the Off-River Lakes and Ponds are to be maintained and thus these areas will not undergo the wetting and drying cycles as will occur in the BWMA units. The survey of Billy Lake was conducted from a vehicle by driving on the dirt road that circumnavigates this small lake. Surveys for all other Off-River Lakes and Ponds were conducted on foot.

Delta Habitat Area

The DHA is a large wetland complex located at the delta of the Owens River and the northernmost edge of Owens Lake bed. The northern boundary of the DHA is located at the Pumpback Station and the southern boundary of the DHA corresponds with a subtle transition from vegetated wetland confined by low dunes and playa to the broadly depressed, unconfined brine pool on the lake bed (Whitehorse Associates, 2005). Due to expansion of the area subject to dust control under the State Implementation Plan, the DHA is now confined on the east and west by a series of dikes and raised roads containing cells which are at least partially flooded for a minimum nine months of the year.

The entire DHA is 3,578 acres and includes 755 acres of wetland habitats, based on 2005 conditions. Vegetated wetlands in the DHA are distributed along main channel of the Owens River which follows a north-south course, as well as across a broad area east of the main channel. The DHA will be managed to maintain and enhance habitats for waterfowl and shorebirds. The DHA will receive a base flow with an annual average release of 6-9 cfs from the Pumpback Station. The DHA will also be subject to a series of four pulse flows spaced throughout the year ranging from 20-30 cfs/day and 5-10 days as described in the MAMP. These pulse flows will commence in 2009. The DHA may also receive excess riverine flows that are above and beyond the capacity of the Pumpback Station. Surveys were conducted on each side of the main river channel, as well as across the vegetated areas to the east. Surveys did not extend beyond the vegetated areas.

4.3. Impacts Noted or Items of Interest Recorded

The following items were documented because of their importance to project managers in determining if adaptive management or mitigation measures are needed, or to evaluate the success or progress of the project or project components. The abbreviation that follows each category is the observation code used for field documentation.

1. **Beaver Activity** (BEA) - Beaver activity can include dams, tree cutting, huts or other evidence of beaver activity such as excessive ponding of water along the river. If evidence of beaver activity was encountered, the observer noted if the activity was recent or not. This was determined by looking for fresh material on dams, fresh chew marks on trees, or fresh vegetative material on huts. In some cases a dam was not visible, but the sound of water falling over the top of the dam could be heard. If a "waterfall" was heard, it was noted as a possible beaver dam. Slow-moving water or ponded water behind a possible dam was also recorded as potential beaver activity. Beaver sometimes respond to the presence of humans by slapping their tail against the water. This is a very loud and distinct sound and indicative of the presence of beaver. Any site that the beaver tail slap was heard was also documented.
2. **Disturbance** (DIST) – Areas of construction or maintenance-related disturbance.
3. **Exotic Weeds** (EXW) – A number of nonnative plants may be found scattered throughout the LORP area. It is neither feasible nor necessary to document all nonnative species, but observers documented the presence of weeds other than "A" or "B" noxious weeds if they formed extensive stands or were otherwise noteworthy. The estimated number of plants was recorded using one of the following abundance categories: 1-5, 6-25, 26-100 or >100.
4. **Fencing Problems** (FEN) - Any vandalism or damage to fences was recorded. The field personnel identified if the fence had been cut, impacted by wildlife, livestock, or age. Field personnel also noted if a particular repair should be given high priority,

based on the presence of livestock in the area or the presence of other potential notable impacts. If wildlife, anglers, or other recreationists were repeatedly attempting to access a fenced portion of the river, the need for an additional access point was noted. Fence lines varying from those depicted on field maps, or open gates allowing driving access to the floodplain were also documented.

5. **Grazing Management** (GRZ) - Grazing management issues that were documented included the presence of livestock supplement sites in the floodplain, excessive trampling of vegetation, high-lining of vegetation, or water gaps resulting in excessive impacts. Since future grazing management plans do not include grazing on the river during July and August, except with prior authorization from LADWP, the presence of livestock on the river was also recorded when encountered.
6. **Noxious Weeds** (NOX) – The Noxious Weed Documentation and Reporting Form was used to record information on California Department of Food and Agriculture rated "A" or "B" noxious weeds, other than tamarisk (see below). The estimated number of plants was recorded using one of the following abundance categories: 1-5, 6-25, 26-100 or >100.
7. **Recreation** (REC) - Evidence of overnight camping or presence of fire rings.
8. **Roads** (ROAD) – In 2009, a road layer was added to the field maps. This road layer contained all roads producing access to or traversing the floodplain that were visible on 2005 satellite imagery. Observers were directed to only note "new roads"- e.g., those not present preproject (2005) or preexisting roads with resource impacts.
9. **Russian Olive** (ELAN) – Russian olive (*Elaeagnus angustifolia*) plants were documented due to concerns involving potential spread of this species in the project area. Although Russian olive is not listed as a noxious weed in California, the California Invasive Plant Council considers this species highly invasive in riparian systems. The estimated number of plants was recorded using one of the following abundance categories: 1-5, 6-25, 26-100 or >100.
10. **Tamarisk** (TARA) – (*Tamarix ramosissima*) – Established saltcedar or tamarisk plants were recorded. The estimated number of plants was recorded as one of the following abundance categories: 1-5, 6-25, 26-100 or >100. This species is listed as a noxious weed by the California Department of Food and Agriculture.
11. **Tamarisk Seedlings** (TARA_SEED) – Tamarisk seedlings or areas of tamarisk recruitment were documented along with site conditions and an estimate of area or number of seedlings. The estimated number of seedlings was recorded using one of the following abundance categories: 1-5, 6-25, 26-100 or >100.
12. **Tamarisk Slash** – Tamarisk slash in the floodplain, on the banks (SLASH) or in the wetted river channel (SLASH_OB).
13. **Trash** (TRASH) – Any accumulation of trash, or other waste such as appliance or furniture.
14. **Wildlife** (WILDLIFE) – Use of the project area by wildlife species.
15. **Woody Recruitment** (WDY) - Native riparian woody recruitment sites detected were documented. The information recorded included the approximate number of seedlings, the height of the seedlings, site conditions, or the presence of competing species, such as tamarisk. The approximate number of seedlings was recorded using one of the following abundance categories: 1-5, 6-25, 26-100, or >100. Woody species that are

of particular interest include any willow species and Fremont cottonwood (*Populus fremontii*). Since it was often difficult to identify willow seedlings to species, observers were asked to note if the seedlings appeared to be tree willow or shrub willow seedlings (usually *S. exigua*) if species identification was uncertain.

16. **Other** (OTH) – Other unclassified items of management concern or interest were recorded as necessary. Where these data involved plants, categorical data was collected. The estimated number of seedlings was recorded as one of the abundance categories: 1-5, 6-25, 26-100 or >100.
17. **Revisit Sites** (Revisit) – Specific sites from the 2008 RAS were selected to revisit. These sites were ultimately selected by the LADWP task leader, after discussion with other task leaders with regard to the nature of the sites to be revisited. Sites from the 2008 survey that were selected to revisit included all perennial pepperweed locations, all Fremont cottonwood recruitment sites, willow recruitment sites involving multiple individuals, tamarisk recruitment sites, and roads causing or with potential resource impacts in meadow or floodplain areas. Categorical data were collected when visiting (EXW), noxious weeds (NOX), tamarisk seedlings (TARA_SEED), and woody recruitment (WDY) sites. The estimated number of plants was recorded using one of the following abundance categories: 1-5, 6-25, 26-100 or >100.

4.4. Methods

4.4.1. Field Planning and Logistics

The RAS involves on-the-ground coverage of 106 river miles in the Riverine-Riparian Management Area and several large wetland areas. An important component of efficient completion of this effort is logistical planning and the availability of trained staff. The 2009 RAS was completed in seven field days, starting August 10 and completed on August 18. Each entity had a person that performed as the task leader and participated in most if not all field survey days. Ms. Debbie House represented LADWP and Mr. Jerry Zatorski represented ICWD. Task leaders arranged for other crew members to participate provided project oversight, trained personnel as needed, and reviewed field datasheets. In addition to the task leaders, ten additional staff members of LADWP, and five additional ICWD staff participated in surveys. In 2009, the RAS involved approximately 68 person-days. The entire RAS crew met the first day prior to going out in the field to discuss the protocol. Staff was broken into groups of four and five during the first day of field work. At least one member of the group had participated in the 2008 RAS and was available to provide oversight. Staff worked in pairs to assure sufficient training and safety on the second and additional days.

Field crews met each morning at a central location (LADWP office in Bishop) and determined the areas to be surveyed, the location to drop off personnel, and made arrangements for shuttle vehicles. Crew leaders also confirmed that GPS units were loaded with waypoint files denoting river miles (in 0.1-mile increments) as reference points, and revisit sites needed for the survey, and that each crew member had other field equipment needed including appropriate field maps and a sufficient number of datasheets. Personnel were provided with *Eastern Sierra Weed Management Area Noxious Weed Identification Handbooks* and a table listing all noxious weeds species that they should be on alert for and asked to review these items. The ICWD task leader provided a key to the identification of woody species present in the LORP. This information was taken in the field as needed to help with identification.

Equipment Required

The following is a list of items required by personnel in the field:

1. Four-wheel drive vehicles for access to routes.
2. Handheld Global Positioning System (GPS) unit (plus extra batteries).
3. Digital Camera (plus extra batteries).
4. Data sheets (3 types): Rapid Assessment Datasheet, Tamarisk Documentation Form, and Noxious Weed Documentation and Reporting Form.
5. Clipboard and writing utensils.
6. Field maps for the day's survey route plus a colored pen for making notes on the map.
7. Waypoints of areas of management interest or concern that need to be revisited, as well as the river mile point file to aid in navigation and orientation.
8. Plastic storage bags for samples of unidentified plants.
9. Cell phone and/or two-way radio and list of cell phone numbers for project personnel.
10. Pack with water and food.

Field Procedures

Field personnel generally worked in pairs to complete surveys of a particular reach or area. One member dropped the other off at the start point of the reach or area to be surveyed. This first person started walking the route (generally upstream to downstream), while the second person drove farther downstream and started surveying from that point south. On the first day, field personnel worked in teams of four for training purposes. Surveyors covered an average of 2.9 river-miles a day, but this ranged from one mile to five miles, depending on difficulty of travel. Also, depending on the number of oxbows, or the specific path taken to cover an area, each surveyor could walk up to three times the number of river miles covered on any one day. Personnel were advised to be prepared to carry all necessary field equipment as well as sufficient water and food to be self-sustaining in harsh field conditions.

The survey generally followed the river's edge however the observer scanned the entire floodplain for potential impact areas. Although the emphasis was on walking near the river edge, stands of tamarisk in the floodplain away from the waters edge were still recorded. Tamarisk plants previously treated were visited to check for resprouting. Field staff took note of any conditions that might be of interest to management within the Riverine-Riparian area. In some areas observers could not walk along the river edge due to impenetrable vegetation such as large stands of *Bassia*, dense saltbush, and flooded areas.

A GPS point was taken for each observation code recorded. GPS units were set to NAD 27 CONUS for all data collection. Field personnel initiated the survey by activating the tracking function of the GPS unit to "track" the entire day's course. The tracking function was set at 0.01 km sensitivity or the "normal or more frequent than normal" setting to record a point every ten meters providing a detailed route. Each time a GPS point was taken, it was recorded on the appropriate datasheet, an observation code was assigned, and detailed notes regarding the location were recorded on the datasheet as described above. To save time in the field, the GPS points bear the default name assigned to them by the GPS unit.

Areas of interest not accessible on foot, or areas encompassing a large geographic area were drawn on maps as opposed to walking the perimeter of the site, in order to save time in the field. These areas are digitized during data compilation.

Photographs of areas of interest or management concern were taken using digital cameras. Camera settings included high resolution settings, wide angle setting, and a date/time stamp (if available). Field staff was instructed to set the date and time settings in the camera and to have fresh batteries. While photographs were not taken at every location at which a GPS point was taken, photographs were taken when the observer felt that a photograph would assist in relaying important information such as visible impacts from roads, the proximity of roads to sensitive habitats, the presence of obstructions in the river, the proximity of tamarisk slash piles to the river channel or riparian habitats, or conditions supporting weed infestations. Other items of interest that were photographed include evidence of woody recruitment, sites or conditions supporting woody recruitment, or evidence of the response of habitat or wildlife to management activities. When a photograph was taken, the observer carefully documented the reason the photograph was taken, and what information the photograph was relaying. As with GPS points, the photographs bear the default name assigned by the camera. After downloading the photographs, the JPEG files were renamed by adding the observer initials as a suffix to the default names due to duplication of file names. Most areas of interest were sufficiently captured by one photograph, however, in rare occasions multiple photographs were warranted. Personnel were required to provide detailed notes associated with multiple photographs per site to ensure accurate cataloging of the photographs.

4.5. Documentation Procedures

Three different datasheets were used during Rapid Assessment Surveys: 1) Rapid Assessment Datasheet; 2) Tamarisk Documentation Form; and 3) Noxious Weed Documentation and Reporting Form. General information that was recorded on these datasheets include the date, observer(s), the field map(s) used, the area or river miles surveyed, and the beginning and end time of each survey.

Rapid Assessment Datasheet

The Rapid Assessment Datasheet was used to document all impacts or areas of interest except established tamarisk plants. On the Rapid Assessment Datasheet, the observer noted the observation code (e.g. FEN), GPS point, photograph number, time of observation, the direction the photograph was taken (if applicable), and detailed information about the observation or photograph.

Tamarisk Documentation Form

The Tamarisk Documentation Form was used to document only established tamarisk plants. The information recorded will assist tamarisk crews in prioritizing areas for treatment, relocating plants, and in the planning of eradication efforts at a site. The observer estimated the distance from the plant(s) to the river, the number of plants, whether or not the plant had resprouted after previous treatment, and the approximate height.

In the case of large or extensive stands of tamarisk, the observer drew a polygon on the field map of the affected area, took a GPS point at each end of the stand, and noted that plants were multiple and widespread, as appropriate.

Noxious Weed Documentation and Reporting Form

Any noxious weed with a California Department of Food and Agricultural rating of "A" or "B" (other than tamarisk) was documented using the Noxious Weed Documentation and Reporting Form, as well as recording observations on the Rapid Assessment Datasheet. The Noxious Weed Documentation and Reporting Forms are sent to the Inyo/Mono County Agricultural Commissioner's office when completed. The Inyo/Mono County Agricultural Commissioner's office is responsible for the treatment of noxious weeds (other than tamarisk) in the LORP area. These datasheets contain all the information necessary for location and treatment of the noxious weeds.

A photograph was taken of the noxious weed and or the site of occurrence. Samples of plants were taken along with a photograph if the observer was unsure of identification of a species. The effected location was mapped on field maps if needed.

4.6. Data Management and Custody

Field datasheets were checked for completeness by field personnel as well as the project leader. Each field person was responsible for making sure their GPS unit and digital camera were downloaded on a daily basis. The Garmin mapping program *Mapsource* was used to manage track and waypoint files. Track and waypoint files were downloaded in *Mapsource* and saved as a GDB file. Task leaders reviewed the *Mapsource* files to make sure any extraneous track points or waypoints were removed. Track and waypoint files were transmitted electronically to the ICWD GIS Administrator, Mr. Chris Howard. A copy of all photos and datasheets were sent to ICWD for data entry into a *Microsoft ACCESS* database and for the development of *ArcGIS* spatial database layers. ICWD staff also digitized information on the field maps that was not documented as a waypoint such as extensive stands of tamarisk or slash.

Field forms were assigned a document control number which consisted of the prefix "RA", indicating the project (e.g. Rapid Assessment), a unique identifier which will be the ACCESS database auto number assigned to the record. The Tamarisk Documentation Form also received a suffix – TARA. After ICWD completed data entry and proofing, the database was sent to LADWP for use in drafting the bulleted summary and annual report. All original datasheets were photocopied, scanned, and will be stored at the LADWP office in Bishop. For noxious weeds other than tamarisk, Noxious Weed Documentation and Reporting Forms were filled out by LADWP and ICWD; and sent to the Inyo/Mono County Agricultural Commissioner's office. ICWD staff created maps showing the location of all tamarisk including seedlings documented during RAS and data associated with the sites. These maps were provided to the ICWD tamarisk control Project Manager. Changes to fence lines, cattle guard or walk-through locations were made by LADWP staff. For fencing issues, a Fence Repair Request Form was filled out and submitted to the LADWP LORP Project Manager.

Data compilation, data analysis, and report writing took place in September and October. Office time, which involved preplanning efforts, map generation, data entry/analysis, error checking, and report writing was estimated at 42 person-days.

4.7. Data Compilation

Access database queries were used to develop tables showing pertinent information such as the observation code, GPS coordinates, general location within the project boundary, and the observer notes (see Appendix). LADWP staff created *ArcMap* documents for the project area showing locations where observations were documented (see Appendix). The data were plotted on figures with general features and management areas of the LORP (Maps 1 and 2 in Appendix 1). This information was reviewed, summarized, and is presented below.

4.8. Summary of Observations

The following is a summary of observer sightings by observation category. The tables in Appendix 2 contain the raw data and notes for each observation by category. The notes for each observation provide details which will be useful in determining whether a particular site warrants mitigation, adaptive management, or contingency monitoring. The RAS Data ID identifies the survey by an observer covering a specific reach or management area. Data are ordered from north to south. Abundance data are presented in graphs ordered from north to south with the following reaches and habitat areas using the following abbreviations in parentheses.

Intake to Blackrock Ditch (Intake) River Mile 0 to 5

Blackrock Ditch to Two Culverts (Blackrock) River Mile 5 to 16

Two Culverts to Mazourka Canyon Road (Two Culverts) River Mile 16 to 20

Mazourka Canyon Road to Manzanar Reward Road (Mazourka to Manzanar) River Mile 20 to 28

Manzanar Reward Road to Reinhackle Measuring Station (Manzanar to Reinhackle)
River Mile 28 to 33.6

Reinhackle Measuring Station to Islands Lease Grazing Exclosure (Islands) River Mile 33.6 to 38.7

Islands Lease Grazing Exclosure to Lone Pine Depot Road (Lone Pine) River Mile 38.7 to 43.6

Lone Pine Depot Road to Pumpback Station (Depot to Pumpback) River Mile 43.6 to 53.2

Delta Habitat Area (Delta) River Mile 53.2 to 57.6

Blackrock Waterfowl Management Area (BWMA)

Off-River Lakes and Ponds (Off-River)

Beaver Activity

Beaver activity was minimal within the LORP project area. Three locations were noted for beaver activity. The locations where beaver activity was noted are different than those identified in 2008. Two beaver dams were found 200 meters apart south of Mazourka Canyon Road (River Mile 23.6). In 2008, several beaver dams were identified about 3 miles south of this location. An observer heard a beaver tail slap at River Mile 47.9, east of Lone Pine. In 2008, beaver dams were identified both upstream and downstream of this location.

Disturbance

There was one location of general disturbance noted. This is a permitted activity where LADWP is installing a hydraulic gaging station at River Mile 21, south of Mazourka Canyon Road (along the old Mazourka Canyon Road alignment) in the central LORP area.

Exotic Weeds

There were 88 observations of exotic plants. The most common observations were of fivehorn smotherweed (*Bassia hyssopifolia*) and common reed *(Phragmites australis)*. Large stands of fivehorn smotherweed were noted between Blackrock Ditch and Two Culverts. There were also some observations of bassia north of Blackrock Ditch. Some new bassia growth existed, but much of the bassia noted was decadent growth from last year that continued to inhibit or prevent access to the river (Photo 1 – Appendix 3). Although more areas along the river were accessible than last year, dense stands of decadent bassia stands persisted, especially within the Thibaut Riparian Exclosure, thus preventing access to the river in this area. Tumbleweed (*Salsola tragus*) was mixed in with the bassia in many areas. Bassia and tumbleweed have an overall rating of “Limited” under Cal-IPC. *Salsola tragus* is classified as a C-rated noxious weed in the state of California.

Common reed was noted throughout the LORP area (Photo 2 – Appendix 3). It is found in many locations throughout the LORP along the Owens River and is also present away from the river. According to the California Invasive Plant Council:

> “Global genetic issues make it unclear which strains may be nonnative in California. Nonnative strains on the East Coast are major invasives there. *Phragmites australis* is sometimes problematic in California, but it is unclear whether it was historically present in all regions of California.”

Although stands were not documented last year, this species may be more prevalent this year, and may deserve continued documentation.

There were seventeen observations of curlycup gumweed (*Grindelia squarrosa*), primarily near the Intake and in the Thibaut Unit of the BWMA. Many of the observations in the Thibaut Unit were greater than 100 plants, some of these occurred in the Rare Plant Management Area. Curlycup gumweed has been nominated but not reviewed by the California Invasive Plant Inventory (Cal-IPC Publication 2006-02).

There were 14 bull thistle observations, slightly fewer than the 18 records in the 2008 RAS. Bull thistle was found south of the Reinhackle Measuring Station in the Islands area, between Lone Pine Depot Road and the Pumpback Station and in the Delta area. More than half of the bull thistle (*Cirsium vulgare*) observations were in the BWMA (Thibaut and Winterton Slough), and the Off-River Lakes and Ponds, in Lower Twin Lake and at a wooden weir between Upper and Lower Goose Lake. Bull thistle has an overall rating of “Moderate” in the California Invasive Plant Inventory (Cal-IPC 2006).

Black locust (*Robinia pseudoacacia*) trees were seen adjacent to the river just south of Mazourka Canyon Road. These trees were likely present before the LORP restoration was initiated and are not a result of the LORP. Black locust (*Robinia pseudoacacia*) has an overall rating of “Limited” in the California Invasive Plant Inventory (Cal-IPC 2006).

Fencing

There were three locations where a fencing issue was noted though only one location which may require a management response. The three fence observations were in central to south LORP locations. Two old 3-strand fences in disrepair were seen on the east side of the river south of Mazourka Canyon Road and on the west side of the river south of the Islands area (River Mile 39). These fences are not required to be maintained under the grazing management plans and therefore do not require repair. On the west side of the river just above Manzanar Reward Road (River Mile 28), a fence was cut for river access. This break in fencing may provide river access and therefore may require management action.

Grazing Management Issues

Fewer grazing management issues were noted in 2009 as compared to 2008. The most prevalent grazing management issue noted in 2008 was the presence of 11 supplemental feeding locations in the floodplain. In response to the finding during the 2008 RAS, LADWP contacted lessees and requested the removal of supplemental feeding sites in the floodplain, in accordance with the grazing management plans. No observations of supplemental feeding in the floodplain were noted in 2009. Three observations of livestock management issues were noted. In the Islands area, there was some evidence of grazing on willows; however, it is not clear if elk or cattle are responsible for the grazing. Elk were observed in the Islands area (see Wildlife section).

Noxious Weeds

Nine new perennial pepperweed (*Lepidium latifolium*) locations were discovered in 2009 resulting in a total of 26 point locations documented during RAS (see Map 3 in Appendix 1). See also Revisit section, page 26, where seven locations with pepperweed were revisited. This is more than the 10 observations in the 2008 RAS and the three observations in the 2007 RAS. Infestations are occurring in two main areas along the river: 1) between Intake and Two Culverts and 2) between Manzanar Reward Road and Georges Creek Return. One location was also noted in the Winterton Unit of the BWMA. Location information and maps were transmitted to Inyo County Agricultural Commissioner on August 27, 2009. Several sites were treated on September 1, 2009 with the remainder scheduled for treatment on September 8, 2009. Further details of prior treatment of the sites or treatment since discovery can be found in the 2009 LORP Weed Report.

Recreation

Evidence of direct recreational impacts or evidence of potentially unauthorized recreational activities were minimal and were comprised of two separate campfire rings at Two Culverts and a campsite with trash and burn scars on bank between U.S. Highway 136 and the Pumpback Station.

Roads

The observers used 2009 field maps depicting roads present in 2005, or preproject. Instead of having observers note “all roads in floodplain” as in previous years, field crews were directed to note new roads, or existing roads causing resource impacts. A total of 24 road locations were noted by observers, many of which require further evaluation (see Map 4 in Appendix 1). Many of the roads near the Intake had been rehabilitated and there were no signs of vehicle use (Photo 3 – Appendix 3). Other road tracks were flooded which could and in some cases has resulted in vehicles destroying additional vegetation and expanding the road to avoid flooded areas. No road tracks were noted in the BWMA. Tracks through flooded areas were seen south of Manzanar Reward Road at Georges Creek. Road tracks, sometimes single use, were seen in the Islands and Delta areas. Road observations that may need further evaluation are described below.

0.5-mile south of the Intake, a rehabilitated road from construction of the LORP was receiving light use (Photo 4 – Appendix 3). This road can be accessed from a dirt road along the power lines. Some tracks and vegetation damage may have occurred. This area needs further evaluation and possible closure of access points. Another road that spurs off from the power line road about 0.5-mile south of the Intake, is partially flooded. There is rutting and widening of the road as vehicles attempt to drive around the flooding resulting in vegetation damage (Photo 5 – Appendix 3).

South from Blackrock Measuring Station was an observation of the old road crossing near Blackrock Ditch, that appeared still barren (Photo 6 – Appendix 3). There was no new resource damage but the river banks in this area are not revegetating.

Just south of Mazourka Canyon Road was flooding of a road that should discourage future use.

In the Islands area, there is seepage on an off-river access road near U.S. Highway 395. The road is partially flooded and vehicle travel on this road could result in resource impacts.

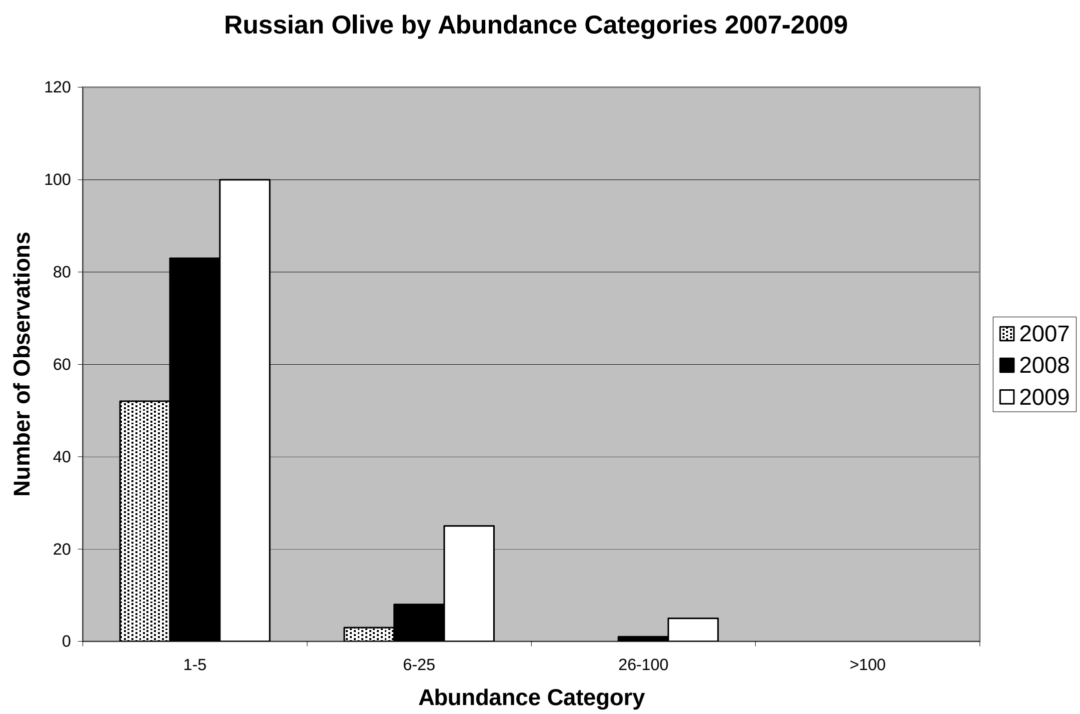
There was off-road vehicle use in an upland area through a gate along riparian fencing east of Lone Pine (Photo 7 – Appendix 3). The gate was open and showed evidence of vehicle traffic, yet there is no existing road. This gate is probably intended to be used for moving livestock. The observer noted “gate should probably be closed and locked.”

At the east arm of the Delta along an existing road, there were multiple vehicle tracks and damaged vegetation adjacent to the river. Multiple new tire tracks were noted at south end of Delta on west side. These tracks went through saltgrass and have created ruts in the soil (Photo 8 – Appendix 3). Since the RAS was completed, LADWP has also noted new and repeated vehicle traffic between U.S. Highway 136 and the Pumpback Station on the east side of the river, especially around the new grazing exclosure on the Delta Lease. See also the Revisit section, page 26, for information on roads.

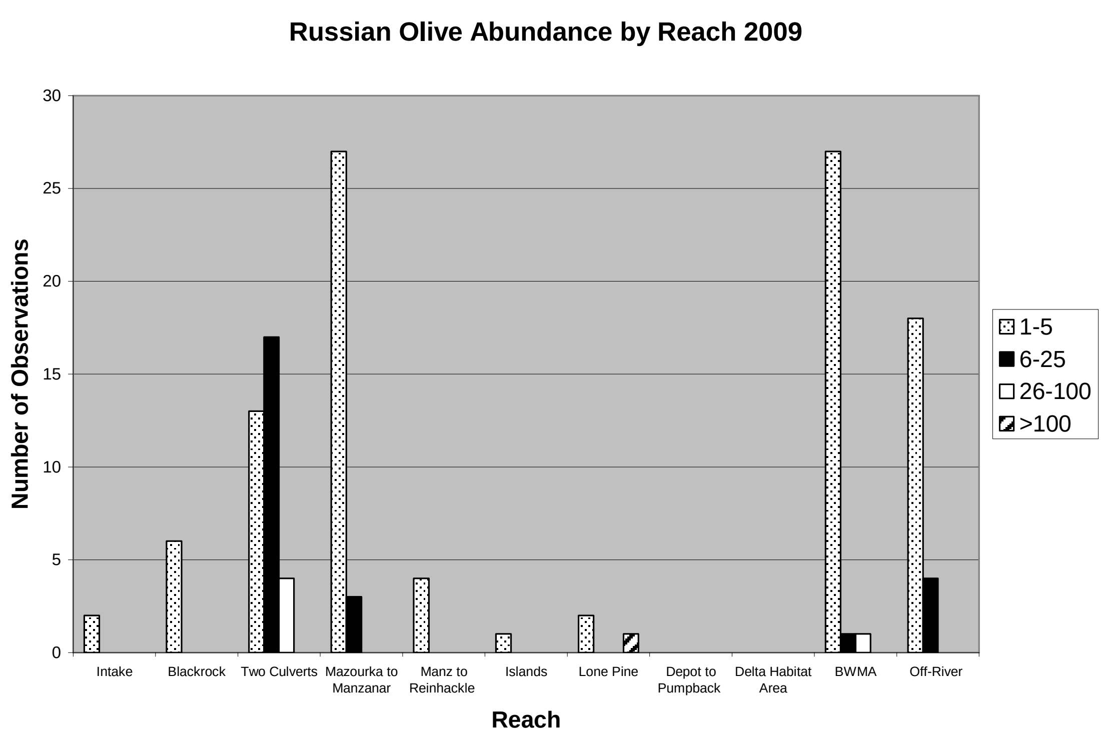
Russian Olive

The nonnative plant species Russian olive continued to persist in the LORP area with some evidence of recruitment and resprouting. There were 134 Russian olive observations in the project area, slightly more than the observations in 2008 (115) and 2007 (75). As in previous years, Russian olive was detected throughout the riverine area south to U.S. Highway 136, the BWMA, and Lakes and Ponds (Maps 5-7 – Appendix 1). Russian olive was not detected in the Lone Pine Depot Road to the Pumpback Station reach or in the DHA.

Most Russian olive observations were of 1-5 plants (see RAS Figure 1). There have been no observations of more than 100 plants in any year. In 2008 and 2009, there were more observations in the higher abundance categories, 6-25 and 26-100, than in 2007. In 2009, the highest concentrations of plants reported (26-100) were in the Thibaut Unit (BWMA) and in the Two Culverts to Mazourka Canyon Road reach (see RAS Figure 2).



RAS Figure 1. Russian Olive by Abundance Categories 2007-2009



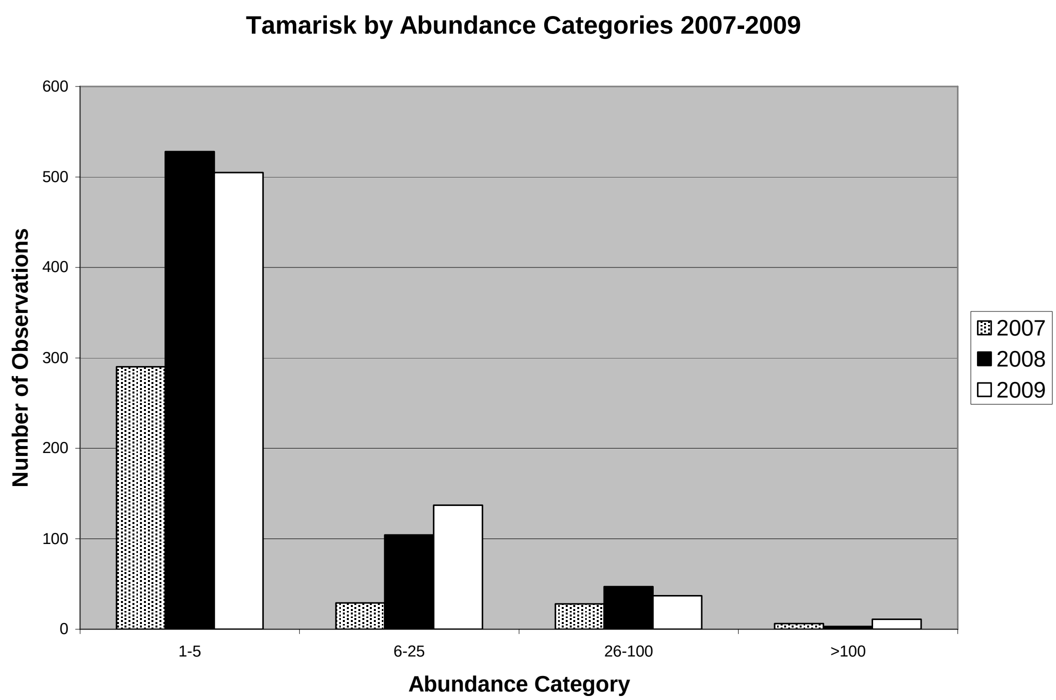
RAS Figure 2. Russian Olive Abundance by Reach 2009

There were observations of Russian olive resprouts in the Twin Lakes area after a March 2009 fire. There were some observations of Russian olive in poor condition, such as a couple observations of dead Russian olive trees standing in water just north of Mazourka Canyon Road. Most of the Russian olive seedling observations were made between Two Culverts and Mazourka Canyon road. Russian olive has an overall rating of “Moderate” in the California Invasive Plant Inventory (Cal-IPC 2006), but has no noxious weed rating.

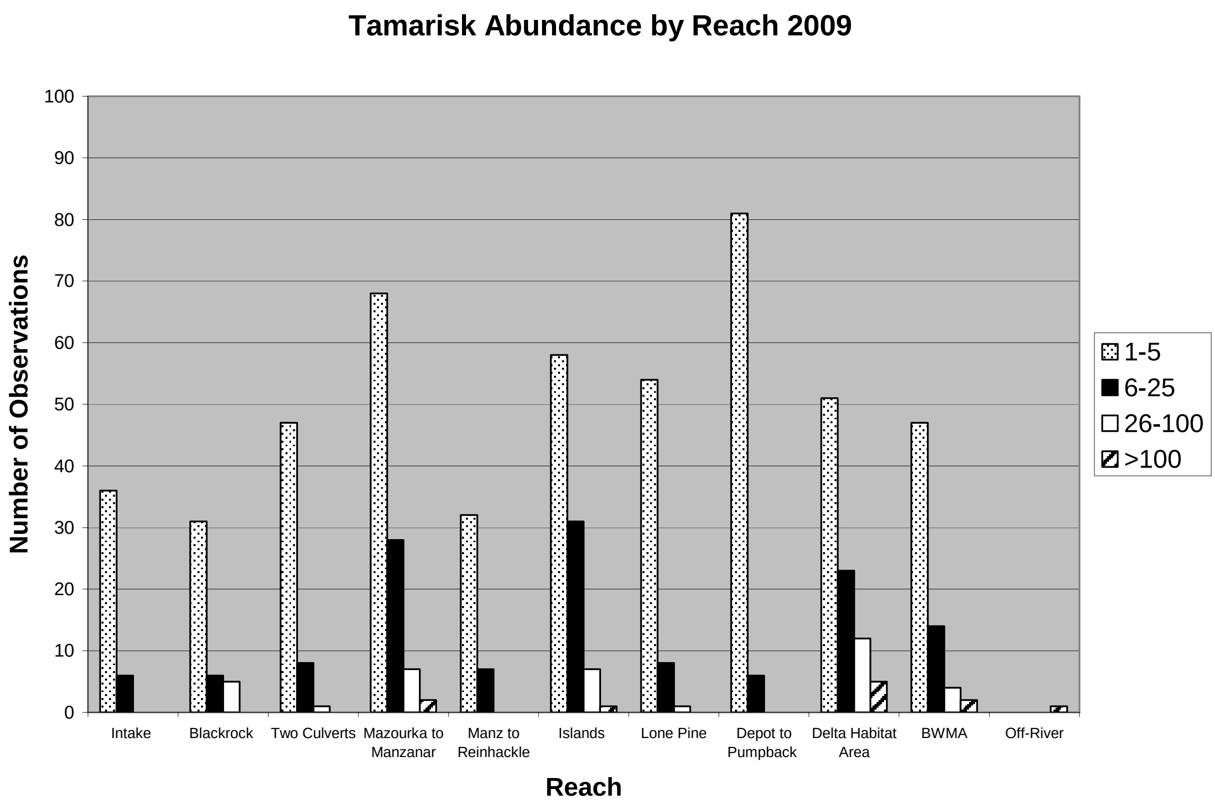
Tamarisk – Resprouts and Untreated Plants

Tamarisk, the most abundant noxious weed in the project area, continued to be documented throughout the LORP project area (Maps 8-10 – Appendix 1). There were 787 observations in 2009, slightly more than the 700 locations reported in 2008 RAS, and greater than the 600 locations reported in the 2007 RAS. Overall, the tamarisk locations have not changed much from previous years. There are areas where recruitment has taken place such as the Islands (Photo 9 – Appendix 3). Although tamarisk control efforts are ongoing, at the larger river scale the maps look similar from year to year. Quantification data collected this year will enable more quantitative comparisons in future years.

The majority of tamarisk data was for 1-5 plants (see RAS Figure 3). Data from 2007 and 2008 were assigned abundance categories where possible. Although the chart does not show many “greater than 100” tamarisk observations for 2007 and 2008, when field notes described “many” plants, it was not possible to assign an abundance category. Therefore, the higher categories of tamarisk plants in 2007 and 2008 may be underestimated. Eleven tamarisk observations in 2009 were for greater than 100 plants. These were mainly in the DHA, with other observations at North Twin Lake (west side), Thibaut Management Unit in the BWMA, a flooded oxbow about one mile south of Mazourka Canyon Road, along a ditch about three miles south of Mazourka Canyon Road, and in the Islands (see RAS Figure 4).



RAS Figure 3. Tamarisk by Abundance Categories 2007-2009



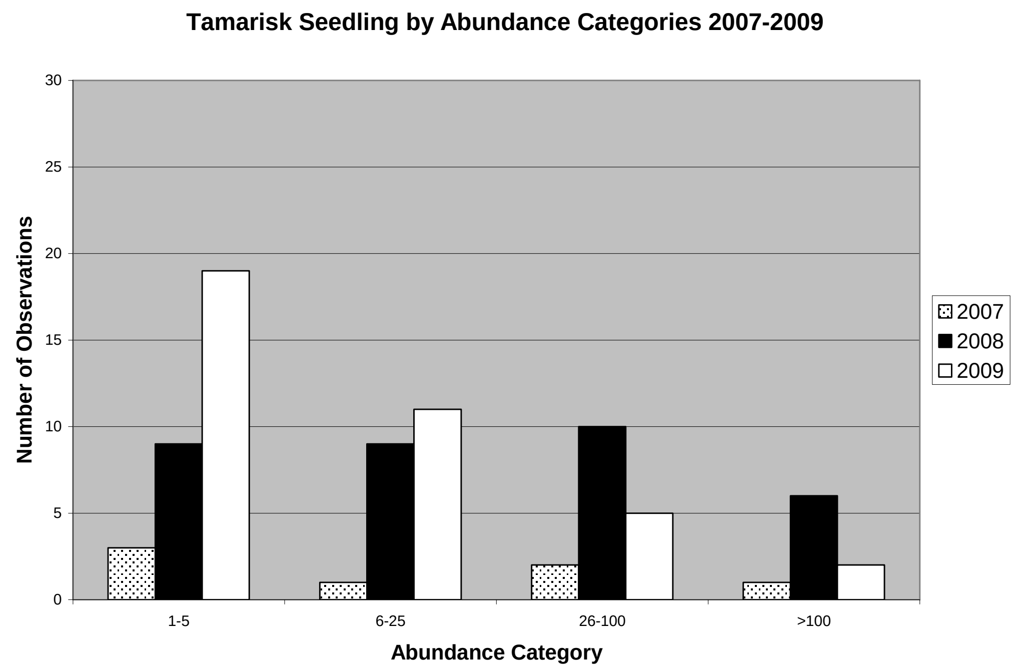
RAS Figure 4. Tamarisk Abundance by Reach 2009

Tamarisk Seedlings

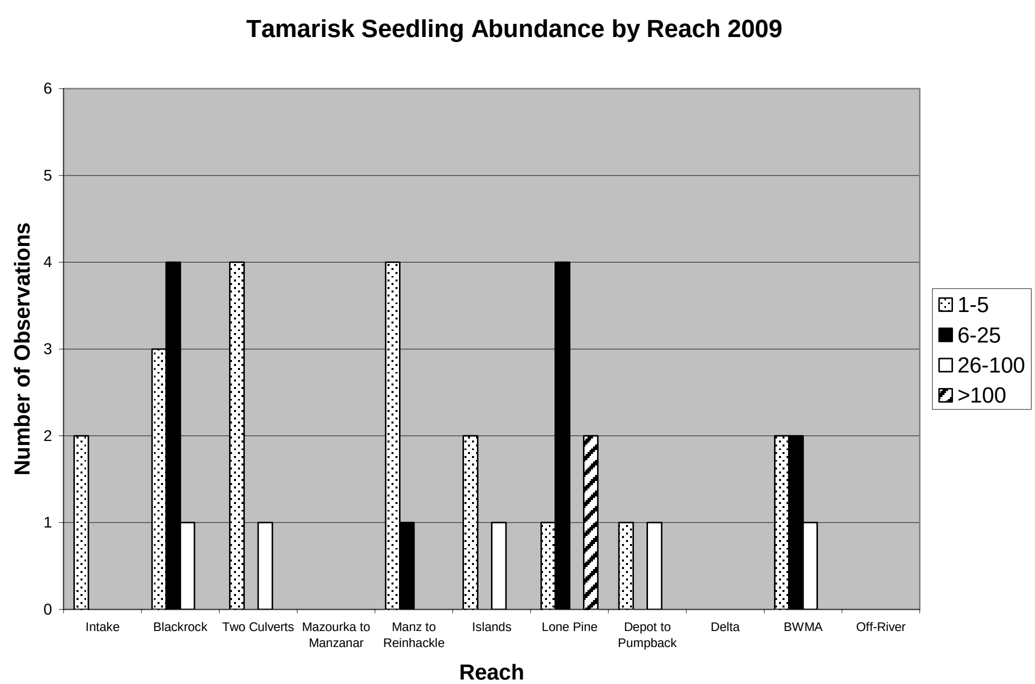
Tamarisk seedlings were found in many areas of the LORP (Map 11 – Appendix 1). The flows that have allowed native woody riparian species to establish have also allowed tamarisk seedlings to establish. The number of sites where tamarisk seedlings were found (37) was similar to 2008 (45) and greater than in 2007 (16). Recruitment sites were typically areas of disturbance, sandy point bars, the muddy margins of the riverbank, or oxbows, and other areas that were inundated during the seasonal flow event in May 2009 (Photo 10 – Appendix 3).

Most observations were in the lower abundance categories of 1-5 and 6-25 seedlings (see RAS Figure 5). There were two observations of greater than one hundred tamarisk seedlings, located south of the Islands in the Lone Pine reach. There were more observations in the higher abundance categories in 2008, including six observations of greater than one hundred tamarisk seedlings.

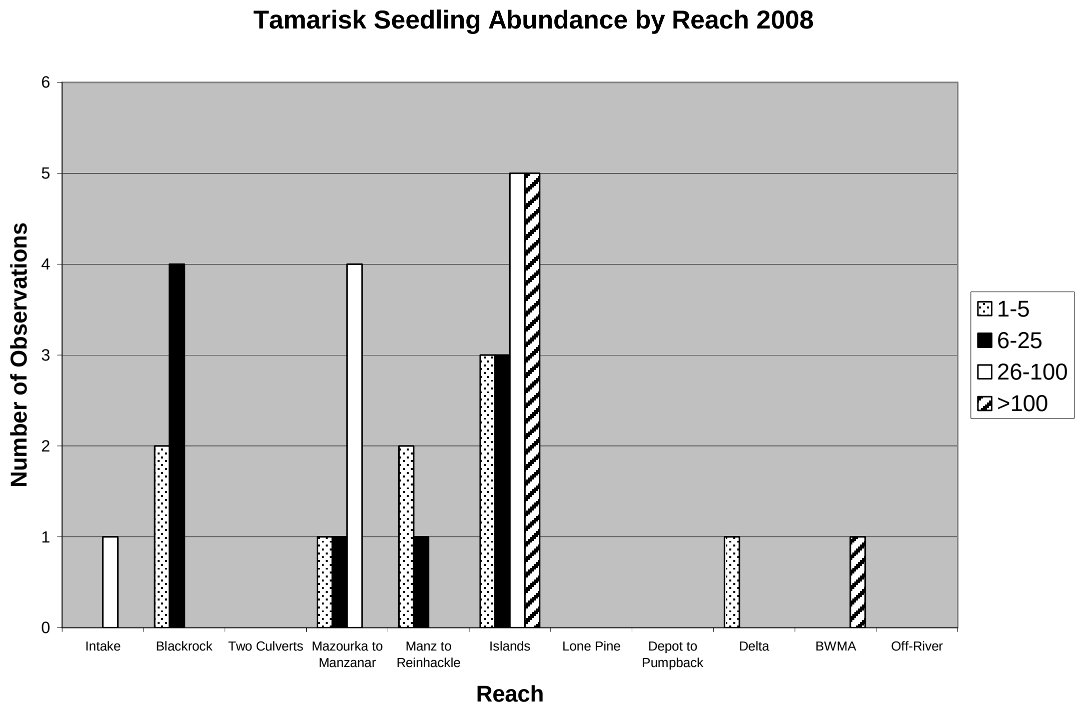
Along the river, most tamarisk seedling observations were in the Blackrock Ditch to Two Culverts reach, Manzanar to Reinhackle reach, Islands area and Lone Pine reach (see RAS Figure 6). Note that there were seventeen revisit sites for tamarisk seedlings (mostly in the Islands area) and these data are not included in this section, but are discussed later in the report under the Revisit Site section, page 27. There were also tamarisk seedlings at Winteron and Waggoner in the BWMA. There were no observations in the DHA or in the Off-River Lakes and Ponds. The observations in 2008 were similar, and in 2007 tamarisk seedlings were mainly in the Blackrock reach (see RAS Figures 7 and 8).



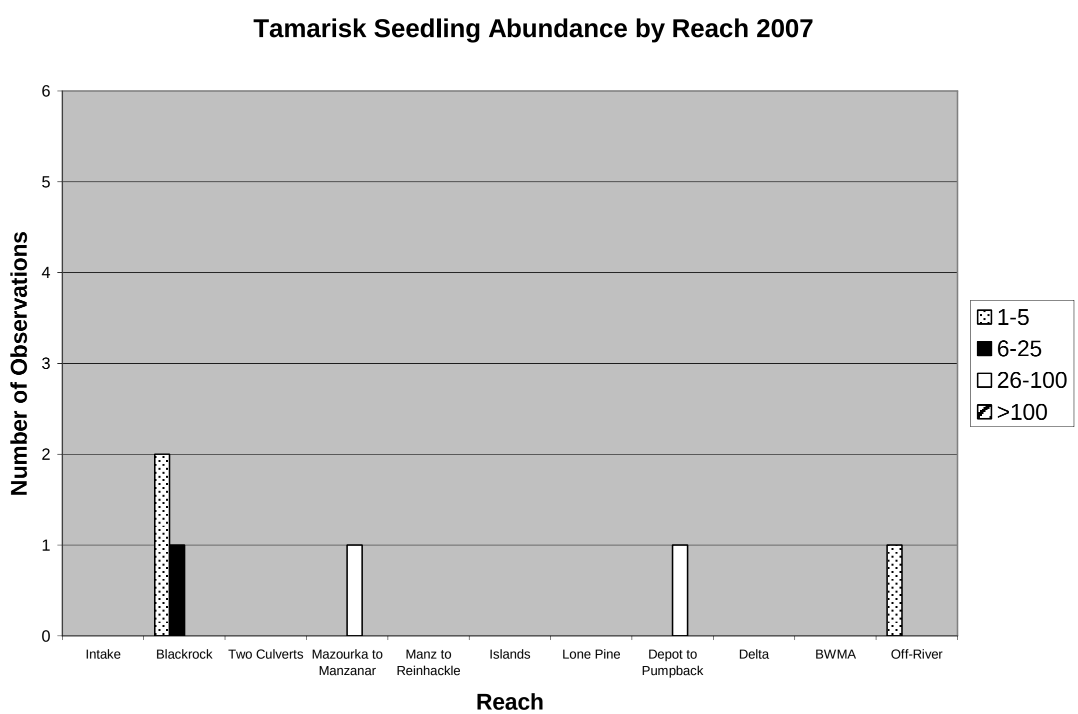
RAS Figure 5. Tamarisk Seedling by Abundance Categories 2007-2009



RAS Figure 6. Tamarisk Seedling Abundance by Reach 2009



RAS Figure 7. Tamarisk Seedling Abundance by Reach 2008



RAS Figure 8. Tamarisk Seedling Abundance by Reach 2007

Tamarisk Slash

Tamarisk slash occurred throughout the LORP Riverine/Riparian area, but was particularly concentrated in the first eleven river miles downstream of the Intake (Photo 11 – Appendix 3). During the last two winters, the burning of slash piles in place has been conducted in this area of the river. When accessible, observers inspected slash burn sites. Saltgrass and willow trees were found to be resprouting in the recent burn areas. It was not possible to access all burn areas, but those visited were found to be free of perennial pepperweed and other noxious weeds. (Six slash piles were observed within the floodplain adjacent to the river channel; three at River Mile 3.2 and three at River Mile 4.1). Multiple slash piles with tamarisk resprouts were noted in the Mazourka Canyon Road to Manzanar Reward Road reach of the central LORP.

Trash

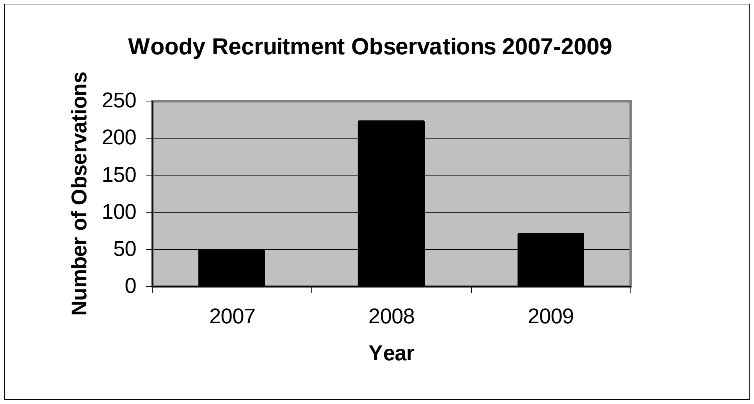
Seven trash or litter locations were scattered throughout the LORP area. Sites included barbed wire north of Blackrock Ditch, a bucket and T-post near Goose Lake, trash at the road near Two Culverts, an old couch near Lone Pine Depot Road, and barbed wire and construction debris near the Pumpback Station in the DHA.

Wildlife

Opportunistic wildlife sightings were noted throughout the LORP area. There were sixty-six observations recorded in 2009. Wildlife observations included sightings of ducks, owls, Great Blue Heron, Belted Kingfisher, hawks, rails, songbirds, Tule elk, Owens Valley vole, coyote, raccoon, bass and carp. Perhaps one of the most notable wildlife observations was that involving the colonization of the former “dry reach” area between the Intake and Two Culverts by Owens Valley voles. Evidence of vole activity including runways and droppings and cut vegetation along runways was seen throughout this area (Photo 12 – Appendix 3). The vole is a LORP habitat indicator species and California species of special concern. Elk were seen in the Two Culverts to Mazourka Road reach, the Manzanar Reward Road to Reinhackle Measuring Station reach and in the Islands area.

Woody Recruitment

Woody recruitment of willow and cottonwoods was found throughout the LORP though at fewer sites than in 2008 (see RAS Figure 9). Several age classes of woody riparian species are now present on the LORP. Observers were directed to use the “woody recruitment” code just for seedlings or plants that sprouted this year. In some cases, observers found it difficult to age young plants. Woody recruitment sites documented may include sites supporting plants that established prior to the 2009 seasonal habitat flow.



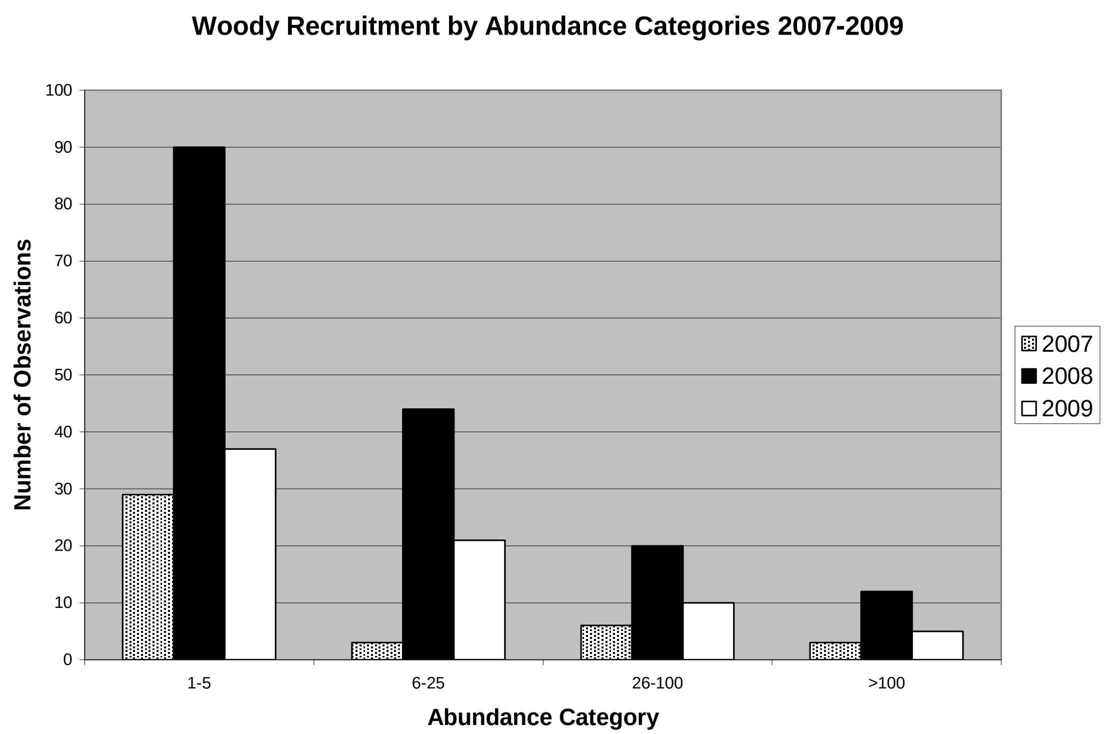
RAS Figure 9. Woody Recruitment Observations 2007-2009

Most of the observations were for willow species including tree willow species such as Goodding's willow (*Salix gooddingii*) and red willow (*S. laevigata*) and shrub willows including narrow-leaved willow (*S. exigua*) and arroyo willow (*S. lasiolepis*). There was only one observation of Fremont cottonwood (*Populus fremontii*) recruitment, though several revisit sites had yearling cottonwoods. Recruitment was noted on the muddy margins of the river, sandy banks, as well as dense meadow areas adjacent to the river that may have been inundated during the seasonal flow event in May 2009 (Photo 13 – Appendix 3).

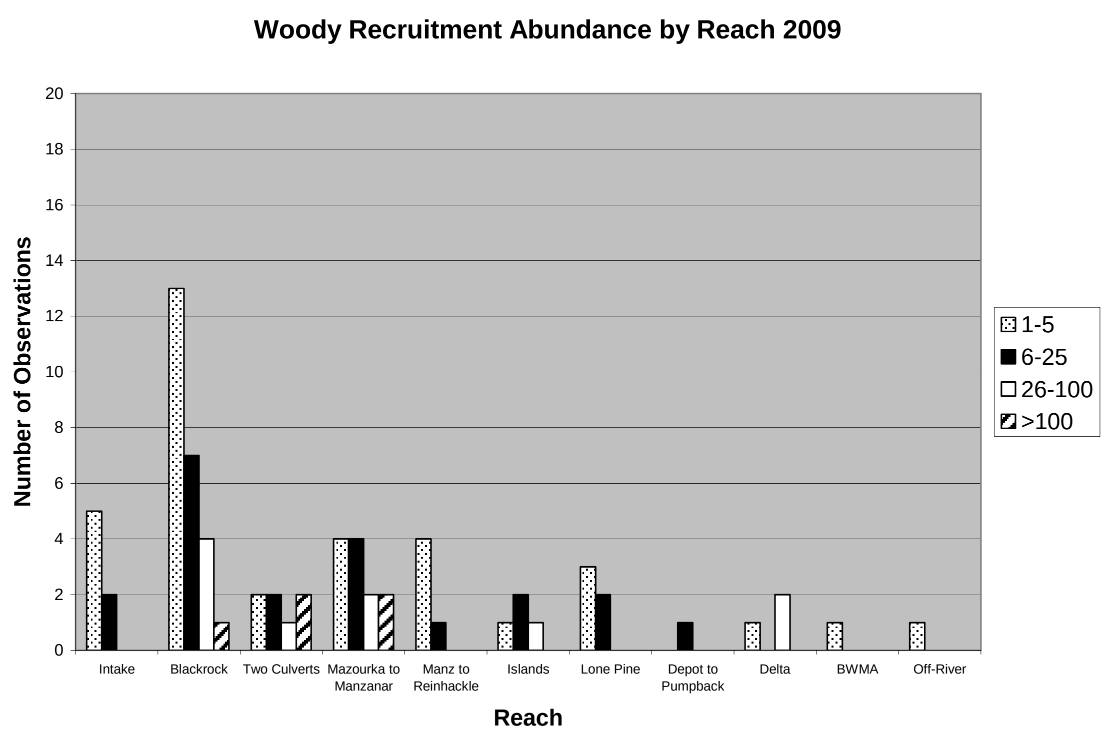
Woody recruitment sites were more heavily distributed in the northern river reaches, particularly from Blackrock Ditch to Two Culverts (Maps 12 and 13 – Appendix 1). This coincides with the highest number of tamarisk seedling observations, which were also in the Blackrock Ditch to Two Culverts reach in 2009. Woody recruitment was lower in the DHA, BWMA, and Off-River Lakes and Ponds. Woody recruitment is unknown in the Thibaut Riparian Exclosure since for the most part the river's edge was not accessible within the exclosure. 2008 also had relatively high woody recruitment from Manzanar Reward Road to the Islands Lease grazing exclosure and in the BWMA.

2009 woody recruitment observation sites were very close to woody recruitment observation sites of 2008 and 2007 with a few new sites. Maps 14-16 in Appendix 1 show 2007-2009 woody recruitment data for reaches with relatively high woody recruitment - Blackrock Ditch to Two Culverts; Two Culverts to Mazourka Canyon Road; and Mazourka Canyon Road to Manzanar Reward Road. In 2009, there were locations closer to the Intake and more sites near Manzanar Reward Road. Also in 2009 there was a new site on the eastside of Upper Twin Lake and a site at Waggoner.

Most observations were of 1-5 willow seedlings and 2008 had the highest numbers of abundance categories of all the years 2007-2009 (see RAS Figure 10). The Two Culverts to Mazourka Canyon Road reach and the Mazourka Canyon to Manzanar Reward Road reach each had two observations of greater than 100 seedlings (see RAS Figure 11). Another observation of greater than 100 seedlings was a moist sandy point bar south of Blackrock Ditch.

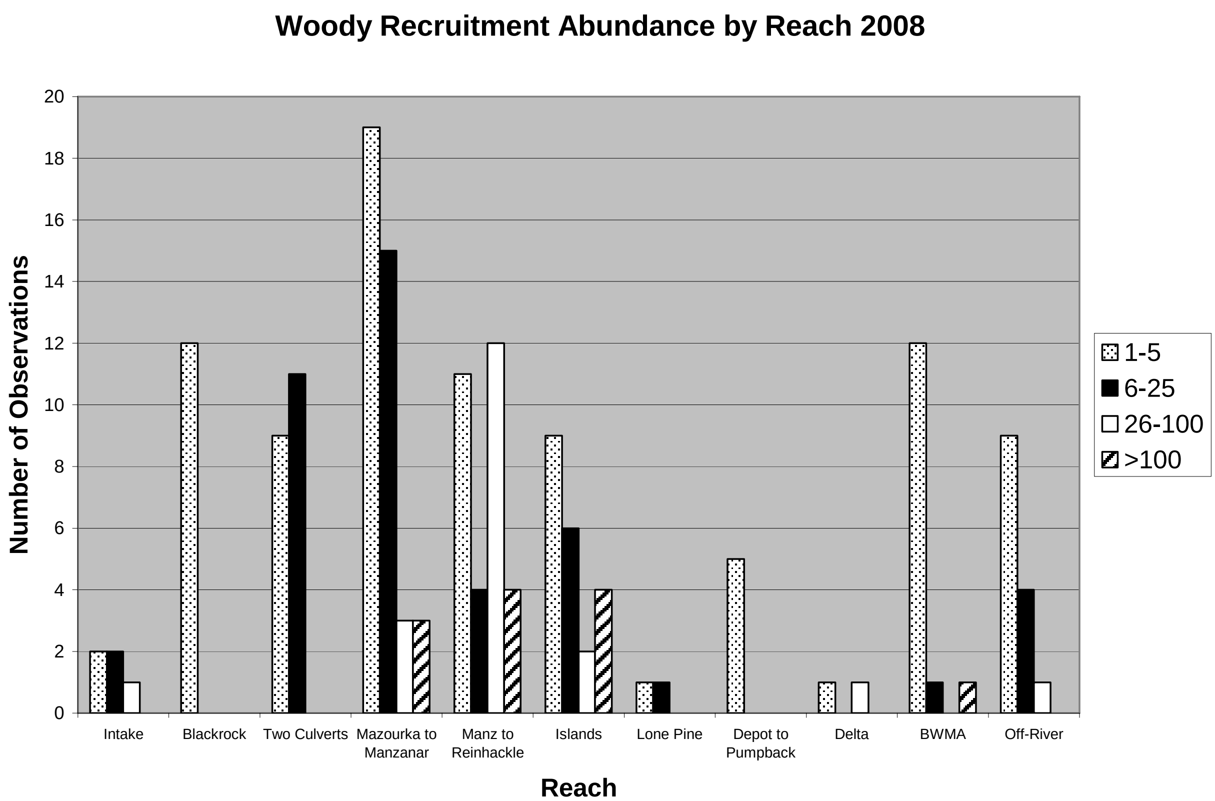


RAS Figure 10. Woody Recruitment by Abundance Categories 2007-2009

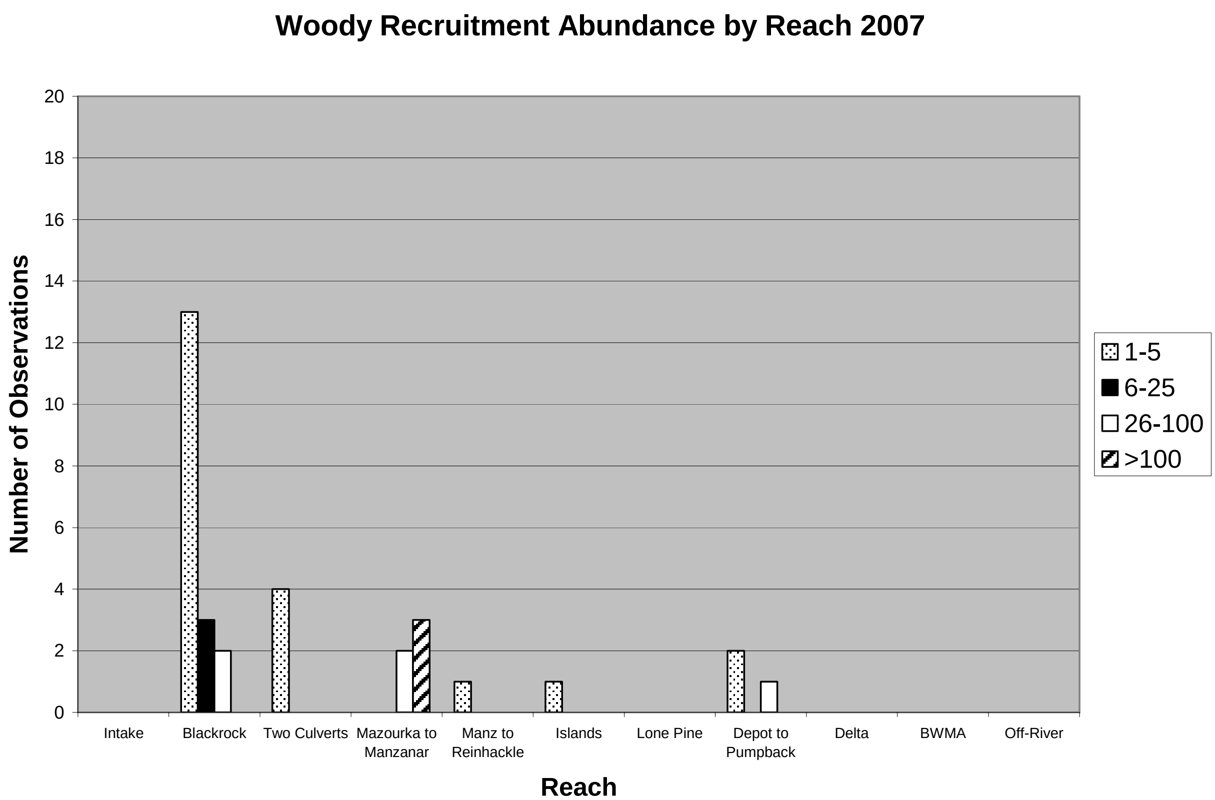


RAS Figure 11. Woody Recruitment Abundance by Reach 2009

The Islands Lease grazing exclosure to Lone Pine Depot Road (Lone Pine) reach had relatively low woody recruitment in 2009; although many tamarisk seedlings were observed (see Tamarisk Seedling section, page 15). Tamarisk seedling recruitment was higher in this reach than woody recruitment. There was one observation of 1-5 willow seedlings at Waggoner (BWMA) and one observation of 1-5 willow seedlings at the eastside of Upper Twin Lake (Off-River Lakes and Ponds). Woody recruitment was higher in these areas in 2008, though no woody recruitment was observed in these areas in 2007 (see RAS Figures 12 and 13). The Blackrock to Two Culverts reach had more observations in higher abundance categories in 2009 compared to 2008, likely due to greater accessibility in 2009 as compared to 2008.



RAS Figure 12. Woody Recruitment Abundance by Reach 2008



RAS Figure 13. Woody Recruitment Abundance by Reach 2007

Other

Observations falling into the "other" category mainly were those concerning hydrology and vegetation. Downstream from the Intake at River Mile 1.3, thick tules and vegetative debris appeared to be slowing flow. It did not appear to be a beaver dam but perhaps just thick tules trapping some debris. Two cut banks were observed in the Blackrock Ditch to Two Culverts reach, just north of the Thibaut Riparian Exclosure. A cut bank at River Mile 10.4 is approximately 25 meters in length and a cut bank at River Mile 11.7 is approximately 15 meters in length (Photo 14 – Appendix 3). The banks were scoured of vegetation and appear to be cutting into the floodplain and may require further evaluation. It is possible that this is a natural channel meander process initiating. In the Thibaut Exclosure area at River Mile 14.3, there were dense cattail and tules in the channel possibly slowing flow (Photo 15 – Appendix 3). There was submerged aquatic vegetation in channel at River Mile 18.7, just north of Mazourka Canyon Road.

Revisit

Sites from previous surveys selected for revisiting included all noxious weed and bull thistle sites, woody recruitment sites and tamarisk seedling sites with multiple plants, and some road, recreation and trash sites. 140 sites along the river were revisited and 22 wetland sites were revisited. The river sites revisited included 87 woody recruitment sites, 17 tamarisk seedling sites, 13 road sites, 8 noxious weed sites, 5 trash sites, 4 exotic weed sites, 3 fence and 3 recreation sites.

4.9. River Sites

4.9.1. Woody Recruitment

The purpose of revisiting woody recruitment sites was to see if willow and cottonwoods recruits survived and if there were other changes that had occurred.

87 woody recruitment sites were revisited (Maps 17 and 18 – Appendix 1). At the woody recruitment sites, willow and cottonwood sapling survival was noted at about two-thirds of the sites. Almost half of the sites had the same or greater number of willows and cottonwoods present in 2009 than in 2008. 23 sites had fewer plants in 2009 than those in 2008. New seedlings were also observed at 18 sites supporting recruitment in 2008. Some observers noted the inundation of saplings at some revisit sites (Photo 16 – Appendix 3).

<u>Intake to Blackrock Ditch</u>

Willow seedlings generally survived and sometimes were associated with tamarisk seedlings. All three sites visited in this reach had some willow seedling survival, though there was one dead willow sapling noted at one site.

<u>Blackrock Ditch to Two Culverts</u>

Nine sites were visited, all but one on the west side of the river. Willow and cottonwood survival was good where it was possible to evaluate (Photos 17 and 18 – Appendix 3). Towards the southern end of this reach, bassia became so thick that access too many sites was limited. At two sites on the west side of the river, cottonwood sapling and sapling red willows (*S. laevigata*) and narrowleaf willow (*S. exigua*) saplings were flooded (not noted in 2008) but were still alive (see Photo 16). Another site on the east side of the river had two cottonwoods on the flooded river edge in 2008, all of which survived in 2009.

At three sites that the observer could only see from a distance, sapling survival and woody recruitment appeared successful. At another site with better access, one cottonwood sapling survived, another cottonwood sapling died and the willow seedlings had died. Notes in the 2008 data did not comment on thick vegetation at these sites. This reach coincides with the Thibaut Riparian Exclosure where livestock grazing is excluded.

<u>Two Culverts to Mazourka Canyon Road</u>

Cottonwood and willows generally survived in this reach. 12 sites were visited, nine on the west side and three on the east side of the river. At several sites, cattails were encroaching and possibly limiting woody recruitment and sapling growth. Two other sites on the west side of the river were noted to be moderately browsed, perhaps by elk. This was one area where elk were observed during the survey (see Wildlife section). At one site on the east side of the river, the observer in 2009 saw *S. gooddingii* willows from 2008 but did not see two cottonwood saplings observed in 2008.

<u>Mazourka Canyon Road to Manzanar Reward Road</u>

Cottonwood and willows generally survived in this reach. 24 sites were visited, approximately half on the west side of the river and half on the east side of the river. At most sites, there were more cottonwoods and willows observed at the sites in 2009 than in 2008. Tamarisk seedlings were found at these revisit sites, though separate tamarisk seedling observations were not recorded in this reach during the RAS. Willow saplings were inundated at some sites, but still alive. In one case it was noted that sapling growth was not vigorous perhaps due to the inundation. Cottonwood saplings were revisited at three sites. At another two sites the cottonwood seedlings seen in 2008 were not relocated in 2009, though willows survived. Some sites did have substantial recruitment; one site on the west side of river had five-ten plants in 2008 and had plants "too numerous to count" in 2009.

Manzanar Reward Road to Reinhackle Measuring Station

Cottonwood and willow survival appeared reduced in this reach compared to other areas. 23 sites were visited; the majority on the west side of the river. Three sites had no survival of either willow or cottonwood seedlings. At a fourth site, the cottonwood seedlings did not survive though willow seedlings survived. Inundation was listed as a reason for the mortality at two of these sites. About half the sites had lower survival in 2009 than seedlings present in 2008. There were a couple sites on the east side of the river where *S. gooddingii* saplings survived but cattail was encroaching. There was also a site where there was some grazing effect potentially due to elk. This was another area where elk were observed (see Wildlife section). At one site on the east side of the river, more than 100 *S. gooddingii* seedlings were still present on the floodplain with saltbush and saltgrass. Another site showed cottonwood recruitment; it had a new *P. fremontii* seedling in 2009 along with 15 of 70 *S. gooddingii* seedlings identified in 2008.

Reinhackle Measuring Station to Islands Lease Grazing Exclosure

Most of the cottonwood and willow seedlings observed in 2008 were not found in 2009. Presumably they did not survive, though it is possible that they were not successfully located. Of fourteen sites visited, the majority of which were on the east side of the river, eight had no survival. One site had the same *S. exigua* seedlings in a meadow that were seen in 2008 (Photos 19 and 20 – Appendix 3). A couple of drying oxbows on the west side of the river where *S. gooddingii* seedlings were observed in 2008 had dried out in 2009 and did not have *S. gooddingii* saplings. Other sites on the east side of the river were still wet in 2009 but did not have *S. gooddingii* saplings.

Islands Lease Grazing Exclosure to Lone Pine Depot Road

One site on the east side of the river was visited in this reach. A willow survived.

Lone Pine Depot Road to Pumpback Station

One site on the east side of the river was visited in this reach. *S. laevigata* seedlings along the bank survived in 2009.

Tamarisk Seedling

Three of 17 tamarisk seedling sites had no tamarisk. All the other sites had year-old tamarisk plants and most of the sites had new tamarisk seedlings, though there were fewer tamarisk seedlings in 2009 than in 2008 for most sites. Most of the tamarisk seedling revisit sites were located in the Islands area, some near Blackrock Ditch, between Mazourka Canyon Road and Manzanar Reward Road and one near the Pumpback Station. Of four sites that had greater than 100 tamarisk seedlings in 2008 (all in the Islands area), only one had greater than 100 tamarisk seedlings in 2009.

Roads

Three of 13 road sites revisited still had evidence of more than occasional vehicle use. Most of the roads near the Intake had been rehabilitated; however, in a few places vehicles had accessed the area and further action may be needed to exclude drivers from this area. The three sites that observers noted should be evaluated further include a road on the east side of the river between

Two Culverts and Mazourka Canyon Road, one south of Manzanar Reward Road and one south of the Islands area.

Noxious Weed

Perennial pepperweed was present at all seven revisit sites where observations were made (one site was inaccessible due to flooding). Perennial pepperweed continued to be present in the locations mentioned earlier in the report 1) Between Intake and Two Culverts (north of Blackrock Return Ditch) and 2) Manzanar Reward Road and Georges Creek Return.

Trash

Trash was again found at the five sites that were revisited. The fishing spot at George's Creek Return had fishing debris (near River Mile 31). Two sites on the river east of the Lone Pine Dump had trash removed yet there appeared to be additional trash (River Miles 45.2-47.9). In one case, a table had been removed, but there was a steel bed frame. The other site had appliances removed, but still had an old television and additional trash. A couple other sites east of the Lone Pine Dump had trash seen in the 2008 RAS visit but no additional trash.

Exotic Weed

Bull thistle was still present at one site. At two other sites, bull thistle was not found by observers. One site was inaccessible due to dense stands of decadent bassia.

Fence

Three fence sites that were revisited did not indicate resource impacts. Two sites where old fences were down were on the east side of the river, between Manzanar Reward Road and George's Return. These fences are not necessary to prevent cattle from river access (one fence is over 300 meters away from the river). A third fence on the east side of the river east of Lone Pine, is overgrown but again is an old fence that is not currently serving a function with regard to the LORP.

Recreation

Two of three sites revisited still had some signs of recreational use. Fire rings were gone but there was trash at the sites.

4.10. Wetland Sites

Of the wetland sites, eight road sites were revisited, six exotic weed sites, four woody recruitment sites, two tamarisk seedling sites, one noxious weed site and one fence site.

4.10.1. Woody Recruitment

Four woody recruitment sites were revisited (Maps 17 and 19 – Appendix 1). Two sites were in the Delta and two sites in BWMA.

<u>Blackrock Waterfowl Management Area</u>

Two sites on the east side of Winterton Slough were visited. Survival of willow and cottonwood was mixed, but generally poor. At one site *S. exigua*, *S. laevigata* and *P. fremontii* seedlings seen in 2008 were not seen in 2009. Instead, Russian olive (*Eleagnus angustifolia*) was present. At the other site, hundreds of willow (*S. exigua* and *S. laevigata*) and six cottonwood (*P. fremontii*) were seen in 2008. The observer did not find the cottonwood in 2009, but saw ten *S. gooddingii* seedlings.

Delta Habitat Area

Two sites in the DHA were revisited. *S. exigua* saplings were seen at both sites in 2009.

Tamarisk Seedling

Two sites at Winterton Slough were revisited. Larger tamarisk plants and new tamarisk seedlings (6-25) were observed at both sites.

Roads

Four of the eight road sites revisited still had evidence of more than occasional vehicle use. A couple roads near Thibaut had been rehabilitated. Road sites that require further evaluation were in the Thibaut and Delta areas.

Noxious Weed

The perennial pepperweed site detected in the Drew Management Unit in 2008 was inaccessible this year due to flooding.

Trash

None visited.

Exotic Weed

Six sites were revisited. At most of the sites (eastside of Winterton Slough) bull thistle was present but was dead or dying.

Fence

A fence at Thibaut ponds was functioning properly.

Recreation

None visited.

4.11. Response to Ecosystem Sciences 2008 LORP RAS Adaptive Management Recommendations

Report Composition

Develop consistent documentation and reporting template that will enable better comparison between years of data collection.

Response

Data are organized by an observation code (BEA, TARA_SEED, etc.). The data are discussed in sections for each observation code. Data are presented in tables organized geographically from north to south. The abundance data code added this year will facilitate comparison between years of data. Rather than having to sort through data notes, data from multiple years can be compared quantitatively.

Data Organization and Management

Future RAS efforts should include a categorical data element. Annual data collection needs to be integrated in order to better analyze changes from year to year.

Response

A categorical data element has been added to the observations for which multiple individuals are likely. These observations codes are exotic weeds (EXW), noxious weeds (NOX), Russian olive (ELAN), tamarisk (TARA), tamarisk seedlings (TARA_SEED) and woody recruitment (WDY). There are columns for 1-5, 6-25, 26-100 and >100 individuals. The observer makes a checkmark in the appropriate column. 2007 and 2008 data were reviewed and categorical information was added where there was specific information in the notes to make this possible.

Data integration is taking place by having all data (2007-2009) in an ACCESS database and in a GIS. There are some challenges in comparing data between years because of difference in data collection methods; however, this is becoming increasingly standardized. 2007 and 2008 data were reviewed to add categorical data information. There was enough specific information in the data notes to add categorical data to approximately 70% of the exotic weed, Russian olive, tamarisk seedling, woody recruitment and revisit site (for which categorical data is appropriate) data. Greater data integration in the analysis has taken place in this report as compared to previous reports. Graphs comparing 2007-2009 data were prepared and included in this report.

Noxious Weeds

Perennial pepperweed was detected at four different sites and appears to have spread from previous years. Locations should be verified and treated multiple times to prevent further expansion.

Response

The sites were verified in the 2009 RAS. Location information and maps were transmitted to the Inyo County Agricultural Commissioner on August 27, 2009. All of the pepperweed sites detected during 2007 and 2008 RAS were transmitted to the Commissioner which is responsible for treatment. For all sites documented in 2009, LADWP requested that the Commissioner notify LADWP of actions taken. The Commissioner notified LADWP that several sites were treated on September 1, 2009 with the remainder scheduled for treatment on September 8, 2009.

Exotic Weeds

2008 RAS noted dense stands of smartweed (*Bassia hyssopifolia*) encompassing much or all of the floodplain over a roughly 10-mile section of the river. This presents an opportunity for adaptive management. Control methods including physical, biological control, and chemical control. We recommend developing a study design of one or more methods of control to be used to treat selected sections of the infestation and monitor results.

Response

To facilitate livestock trampling of dead *Bassia hyssopifolia*, LADWP is allowing the lessee to graze the White Meadow Riparian Field without adherence to grazing utilizations standards during the 2009-2010 grazing season.

Woody Recruitment

Woody recruitment appears to be occurring throughout the floodplain. Future data collection efforts should include categorical data documenting the number of new sprouts per location.

Response

A categorical data element has been added to the woody recruitment observations. There are columns for 1-5, 6-25, 26-100 and 100+ individuals. The observer makes a checkmark in the appropriate column.

Grazing Management Issues

Supplemental feeding sites within the floodplain. Feeding/supplement areas are not permitted within the riparian and floodplain areas. Consultation with lessees and removal.

Response

Following the 2008 RAS report, LADWP consulted with lessees regarding the requirement to remove supplemental feeding sites within the floodplain. It appears that all supplemental feeding sites within the floodplain have been removed. No supplemental feeding sites were detected in the floodplain during the 2009 RAS.

Tamarisk

Request more information and the spatial data on the specific locations where tamarisk eradication was performed. 2008 RAS documented 700 tamarisk points, but reporting issues confounded results. Using categorical data for tamarisk results would alleviate many reporting issues. Data confusion and tabulation makes it difficult to make adaptive management recommendations concerning tamarisk.

Response

A categorical data element has been added to the tamarisk observations. There are columns for 1-5, 6-25, 26-100 and >100 individuals. The observer makes a checkmark in the appropriate column. Data from 2007 and 2008 were categorized when possible and categorical data are presented in this report. Also see Recommendations for future RAS implementation.

Tamarisk Seedlings

2008 RAS seedling sites all need to be visited, verified and treated.

<u>Response</u>

2008 sites were revisited. The locations of all tamarisk seedling locations were forwarded to the Tamarisk Control Project Manager by ICWD staff.

Tamarisk Slash

Large slash piles should continue to be chipped, burned, and/or removed from the streambanks. Pile new slash in appropriate areas, not on streambanks, where LADWP can dispose of them.

<u>Response</u>

For the last two years, LADWP has burned tamarisk slash in place in the first eleven river miles. Treatment of tamarisk slash has been and will continue to occur during the winter months at locations identified and prioritized by ES.

Roads

Data management and clarity of road abundance and impacts is needed as part of ongoing road inventory.

<u>Response</u>

The initial approach to RAS directed observers to “record all roads in the floodplain” as well as ‘new roads’. There are numerous pre-existing roads in the floodplain and it is impractical to record all these roads, particularly when recreational access is not restricted and therefore change not expected. In 2009, a road layer was added to the field maps. This road layer contained all roads providing access to or traversing the floodplain that were visible on 2005 satellite imagery. Observers were directed to only note “new roads”- *e.g.,* those not present preproject (2005) or pre-existing roads with resource impacts. Team leaders need direction from management and ES regarding adaptive management of contingency monitoring of those areas identified in 2009 as having potential resource impacts.

Trash

Removal and proper disposal of several large appliances dumped into the floodplain.

<u>Response</u>

LADWP staff removed trash identified in 2008. However, people have continued to dump at these sites and trash was again found with 2009 RAS.

Beaver

No new recommended action.

4.12. Recommendations for Future RAS Implementation

The following are suggestions submitted by ICWD and LADWP staff who were involved with the 2009 LORP RAS. The recommendations are divided into "Data Collection and Management" and "Training."

4.12.1. Data Collection and Management

Exotic Weeds

Add a species code field to identify the particular species identified. This information was often though not always noted in the comment field. This field would be useful to sort and analyze the data especially between years.

Revisit Sites

Add a "Revisit" field and include the observation code (WDY, TARA_SEED, etc.) for Revisit sites. Currently "Revisit" is one of the observation codes. Because Revisit is the observation code, the type of site (woody recruitment, tamarisk seedling, etc) is not apparent by looking at the record. If the records are sorted by woody recruitment observation code for example, the woody recruitment data that are Revisit sites are not included in the query. Although a field describing the type of record can be added after data collection, it would be more efficient to have this field already included in the record in the beginning.

Include Revisit Site number (FID) field in database.

Roads

Need input from management and ES regarding handling recreational issues, especially for vehicle activity. Establish photopoints to better track changes in resource impacts at selected road sites.

Tamarisk and Russian Olive

Only record established plants every five years. Record only seedlings or resprouts every year. Tamarisk and Russian olive adult plants do not change substantially over the whole LORP area year-to-year.

Tamarisk Datasheet

Eliminate the TARA datasheet. Record TARA on Rapid Assessment datasheet. This along with only recording seedlings and resprouts, except every five years will save field and data entry time without substantial loss of information needed for yearly adaptive management recommendations.

Woody Recruitment

The fate of woody recruitment sites might be better tracked by selecting a subset of all areas supporting recruitment the last few years to monitor. Could evaluate spatially where recruitment has taken place (the patterns) and select sites to return to every year, establish photopoints and otherwise record same data as 2007-2009 RAS.

4.12.2. Training

Camera

Make sure camera dates and years are set accurately. Have observers add Primary Observer initials suffix to photos (e.g. DSC1003_DH.jpg). Rapid Assessment Datasheet

Standardize General Survey Area Description and create a GIS shapefile of the LORP areas using the descriptions below. Upon compilation of the GPS observation points, overlay the points on the LORP Area shapefile and transfer the area attributes to the points. This would provide a simple method for observation analysis.

- Intake to Blackrock Ditch (River Mile 0 to 5.1)
- Blackrock Ditch to Two Culverts (River Mile 5.1 to 16)
- Two Culverts to Mazourka Canyon Road (River Mile 16 to 20)
- Mazourka Canyon Road to Manzanar Reward Road (River Mile 20 to 28)
- Manzanar Reward Road to Reinhackle Measuring Station (River Mile 28 to 33.6)
- Reinhackle Measuring Station to Islands Lease Grazing Exclosure (River Mile 33.6 to 38.7)
- Islands Lease Grazing Exclosure to Lone Pine Depot Road (River Mile 38.7 to 43.6)
- Lone Pine Depot Road to Pumpback Station (River Mile 43.6 to 53.2)
- Delta Habitat Area (River Mile 53.2 to 57.6)
- Blackrock Waterfowl Management Area:
  Thibaut
  Winterton
  Waggoner
  Drew
- Off-River Lakes and Ponds:
  Goose Lake
  Coyote Lake
  Twin Lakes
  Billy Lake

Change datasheet to East / West / Off-River (for Off-River Lakes and Ponds, etc); some observers entered west of River, even though they weren't at the river, they were at Thibaut.

Highlight on the datasheet EXW, NOX ELAN, TARA, TARA_SEED and WDY and instruct staff that categorical information should be collected for all these observation codes. Personnel did not always collect categorical information for these observation codes. Consider whether categorical information should be collected for TARA_SLASH. When 2007 and 2008 data were reviewed, categorical information was added to some TARA_SLASH data. However, no one in 2009 collected categorical information for TARA_SLASHs. Data in the Revisit and Other Observation codes will occasionally also have categorical information.

Modify datasheet to include Primary Observer and Other Observers. In the database, only one observer is entered. With the current system, the Primary Observer must be determined by the database manager. Make datasheet contain no grayscale in data entry fields.

Exotic Plants

Provide clarification to observers on which exotic plants to record. For example, due to its potential to become a problem invasive, include *Robinia pseudoacacia* (ROPS) on list of invasive plants to document.

Consider elevating *Lepidium latifolium* (LELA2) to its own impact code due to its invasive potential. Encourage collecting specimens of unknown plants.

GPS

Make sure personnel take GPS points for all data points including Revisit sites. Because some field staff collected GPS points for the Revisit sites and other staff did not, there were two sets of data. It was necessary to do a query to put these two datasets together.

Some observers entered the Impact Code into the GPS Description field. They should not do this. The Description field should contain the date and time of the feature being collected, i.e. "10-AUG-09 9:40:57AM".

Tracks and points should be in the same GDB file, named similar to "2009_08_10_DS.gdb."

Maps

The importance of using field maps to document non-GPSed items should be emphasized.

Observers should not annotate maps with points they are already collecting GPS points; only annotate maps with non-GPSed features.

Use fine point red Sharpies on field maps, not hard-to-read pencil or pen.

Metric

Emphasize exclusive use of metric system.

Revisit Sites

Make sure Revisit site labels show up on map. Perform queries before going out in the field listing what Revisit sites would be in each section. If a Revisit site is not revisited, instruct staff to record why the Revisit site was not visited.

Ask observers to collect new GPS positions for Revisit waypoints and enter revisit waypoint number in notes. Make sure RW code is used for Wetland Revisit sites.

Tamarisk

For TARA observations suggest terms like flowering/non-flowering and number of plants.

Woody Recruitment

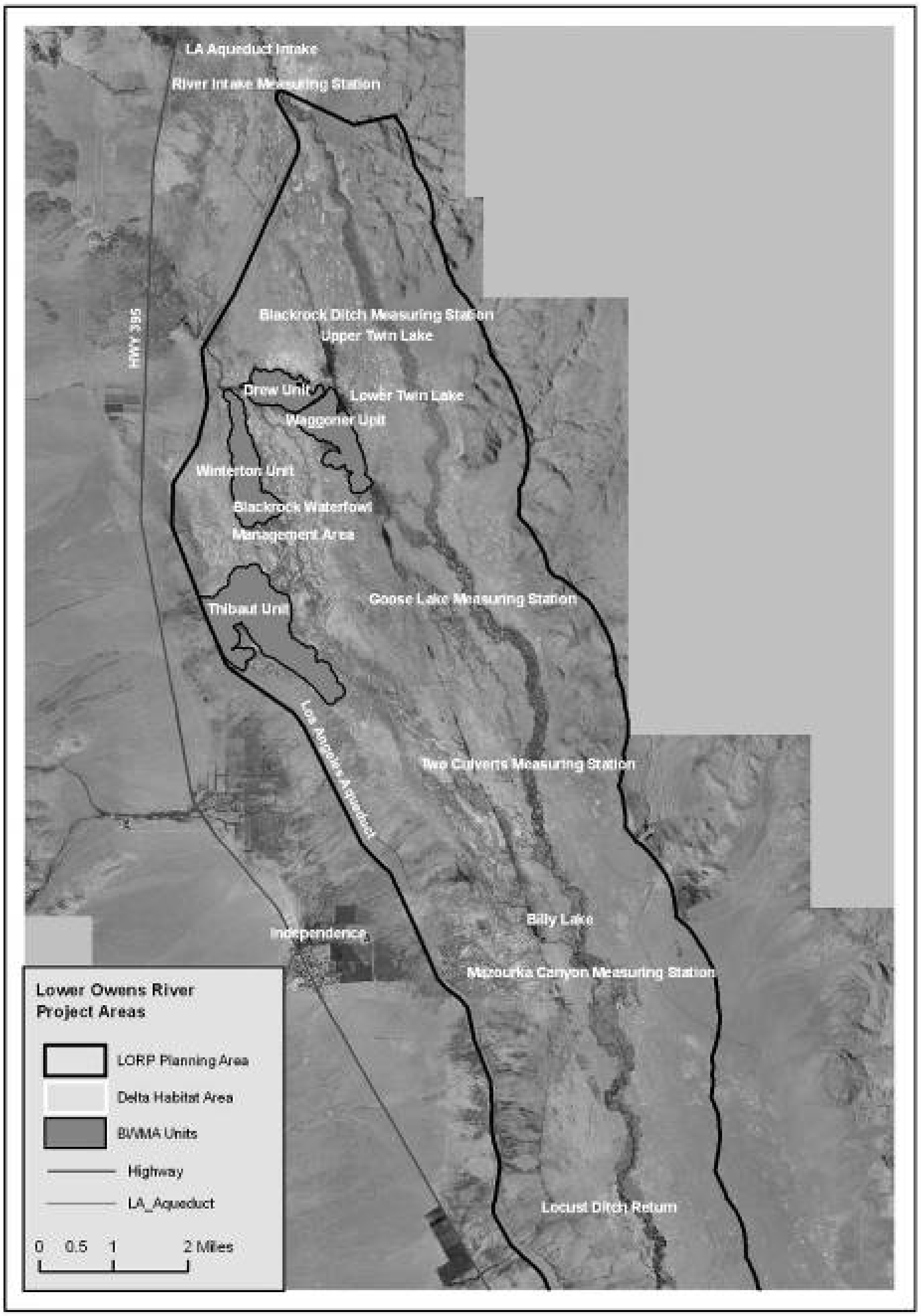
Continue to instruct personnel to record only new seedlings not saplings.

Age Class Field

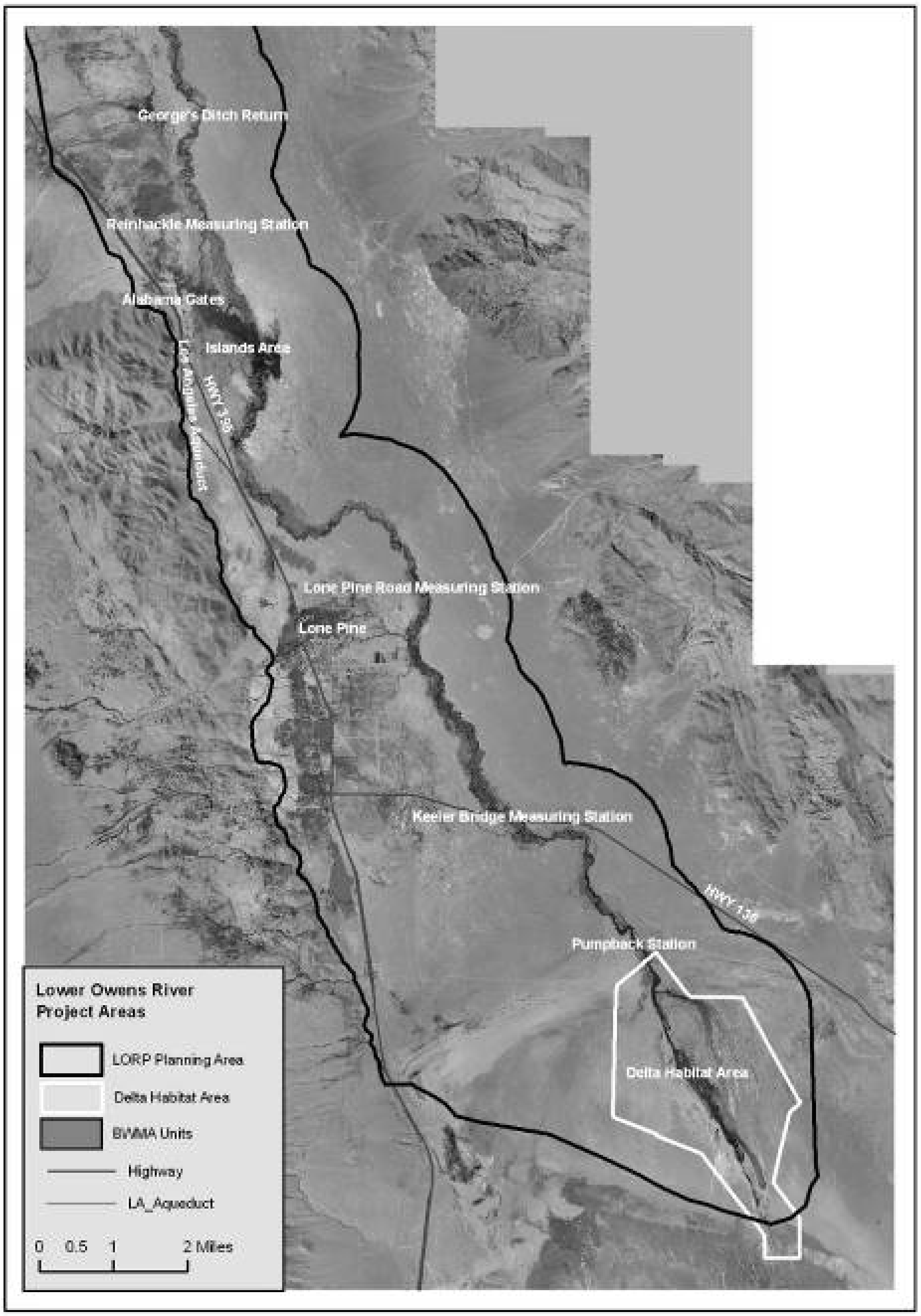
Include a new column on the datasheet called "Age_Class." When appropriate, observers would enter SEED (seedling), SAP (sapling), or RSP (resprout). This field would be applicable to NOX, ELAN, TARA, and WDY. By including an Age_Class field on the datasheet, there would be no need for a TARA_SEED impact code.

4.13. Appendices

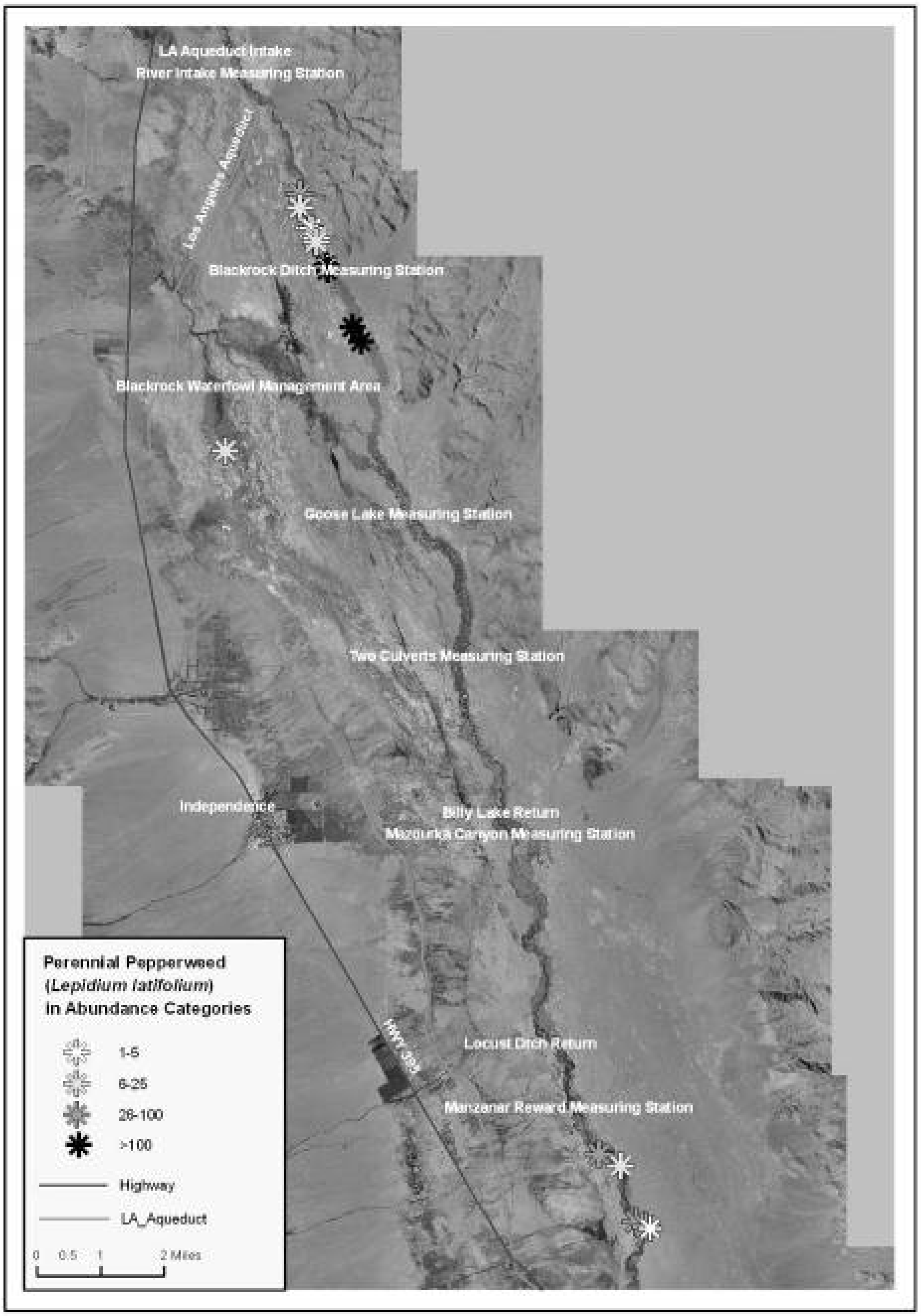
4.13.1. Appendix 1. Rapid Assessment Survey Maps



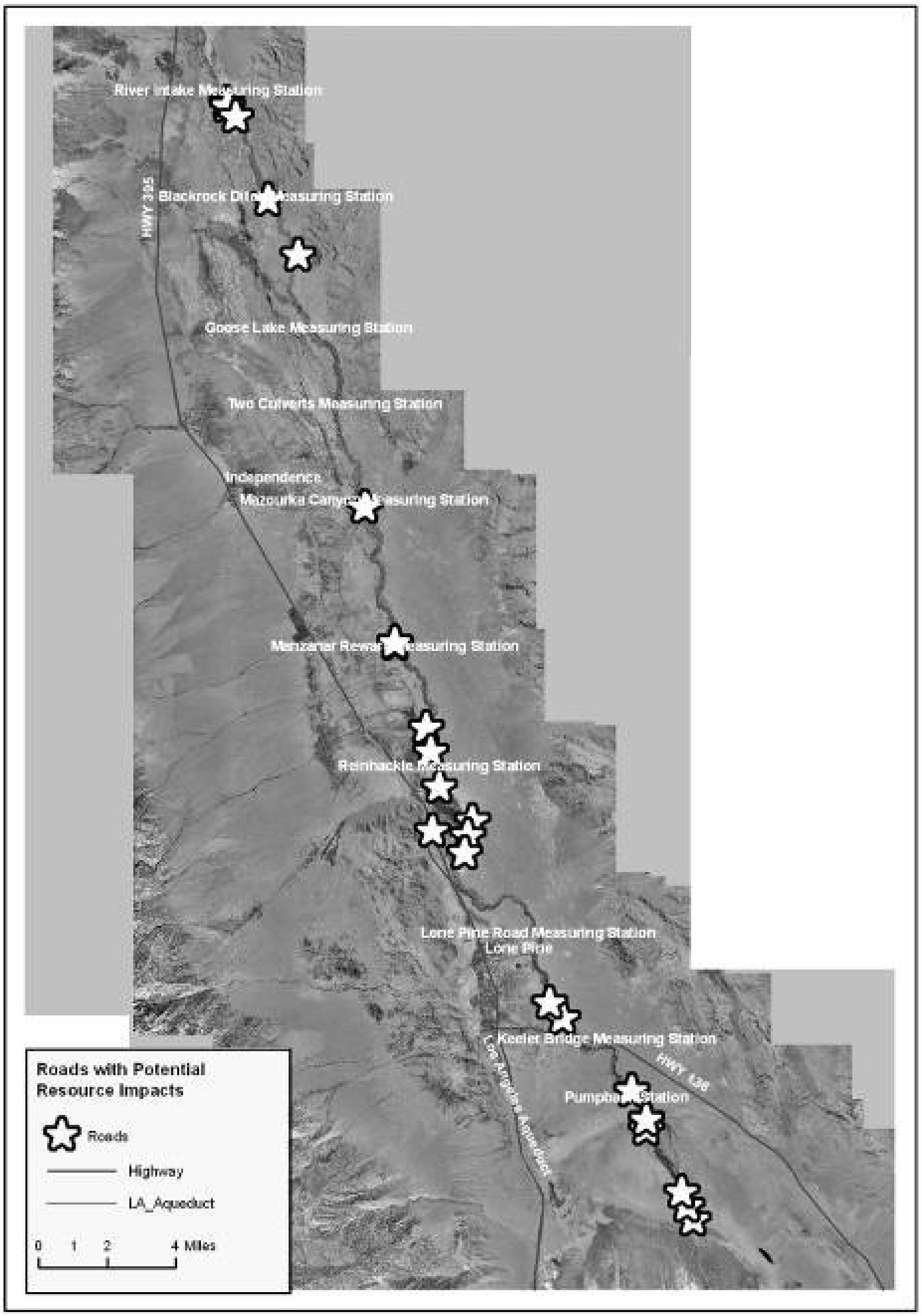
Map 1. General Features or Management Areas of the LORP, Upper LORP



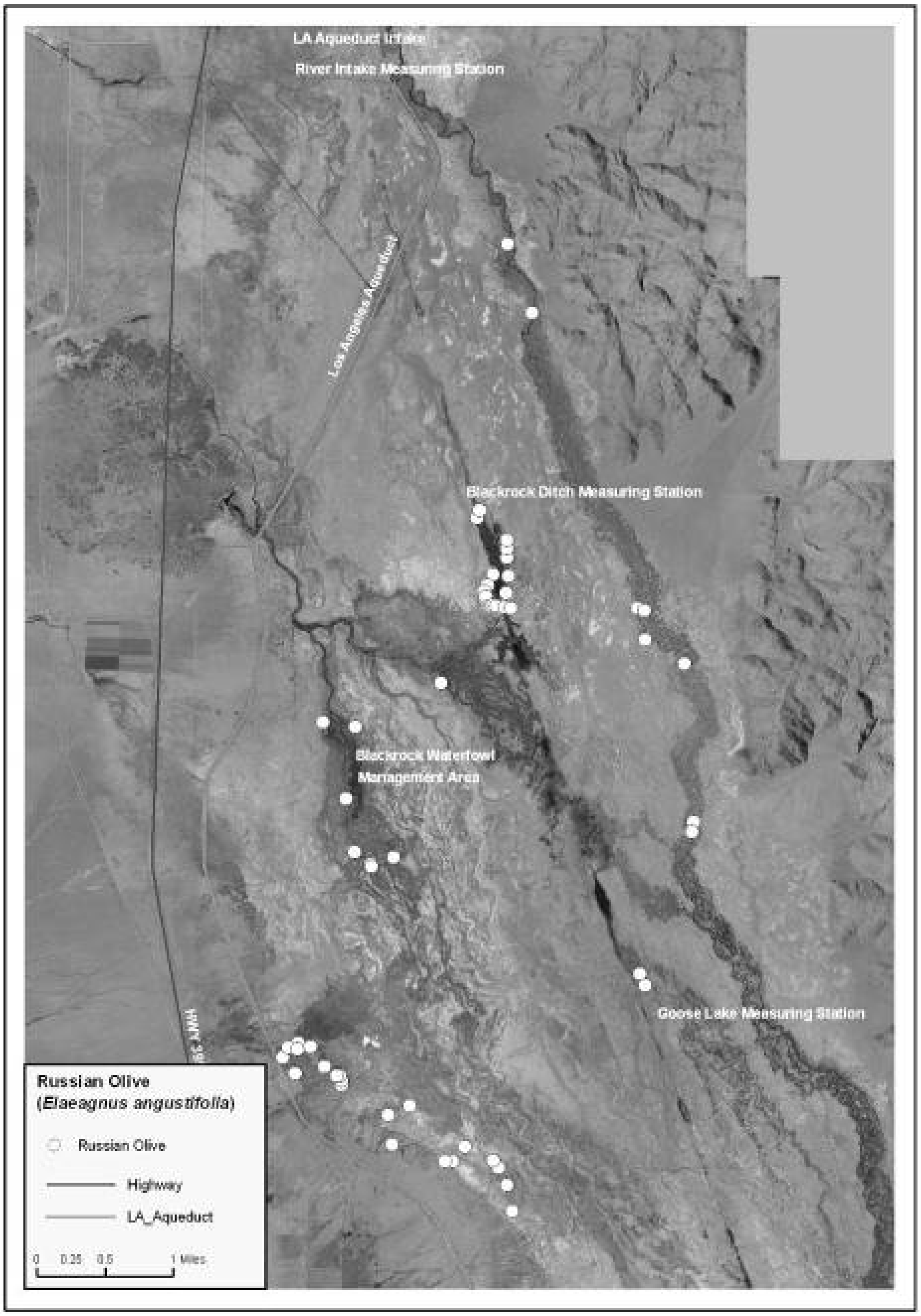
Map 2. General Features or Management Areas of the LORP, Lower LORP



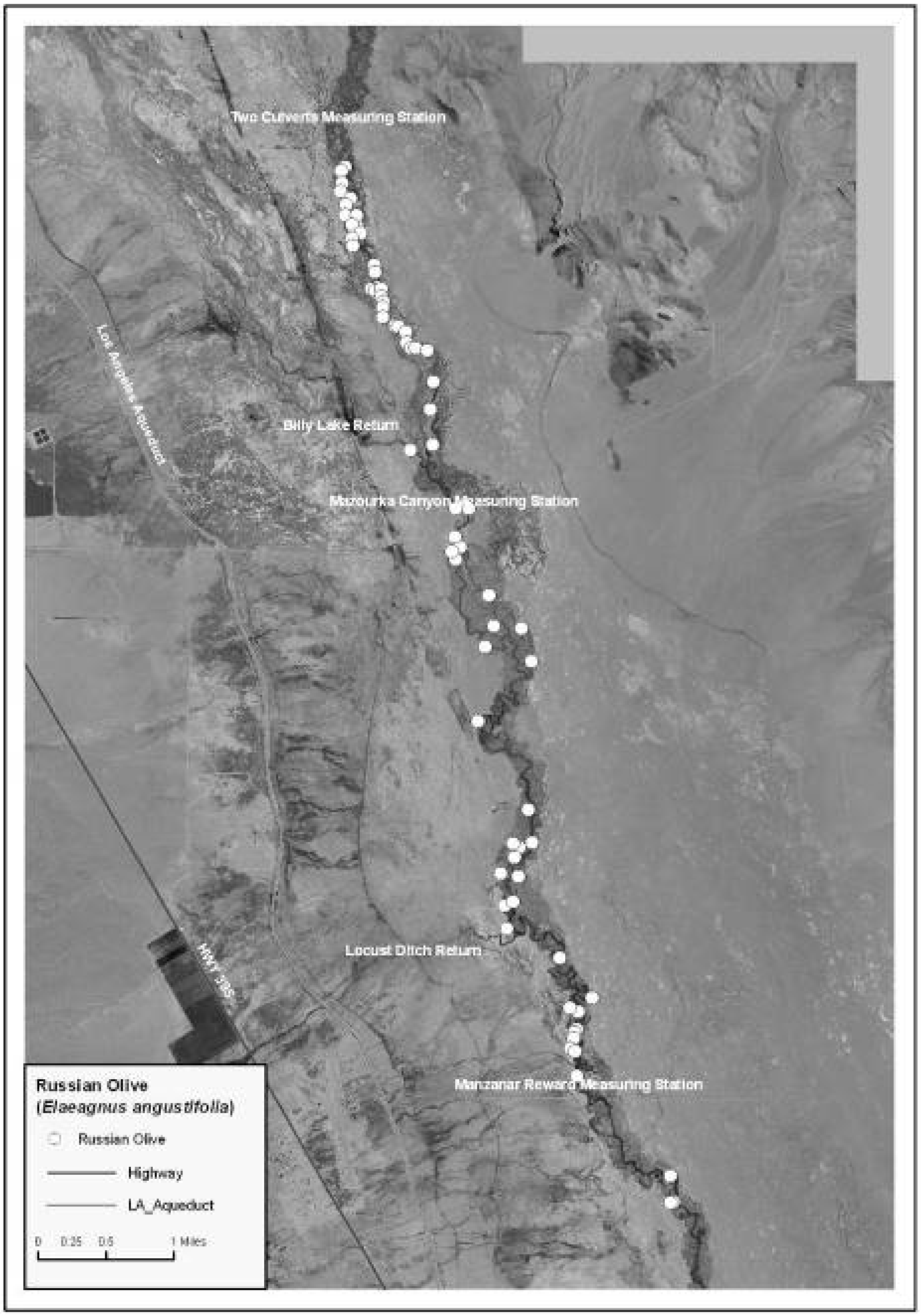
Map 3. Locations of Noxious Weeds (Perennial Pepperweed – *Lepidium latifolium*) 2009



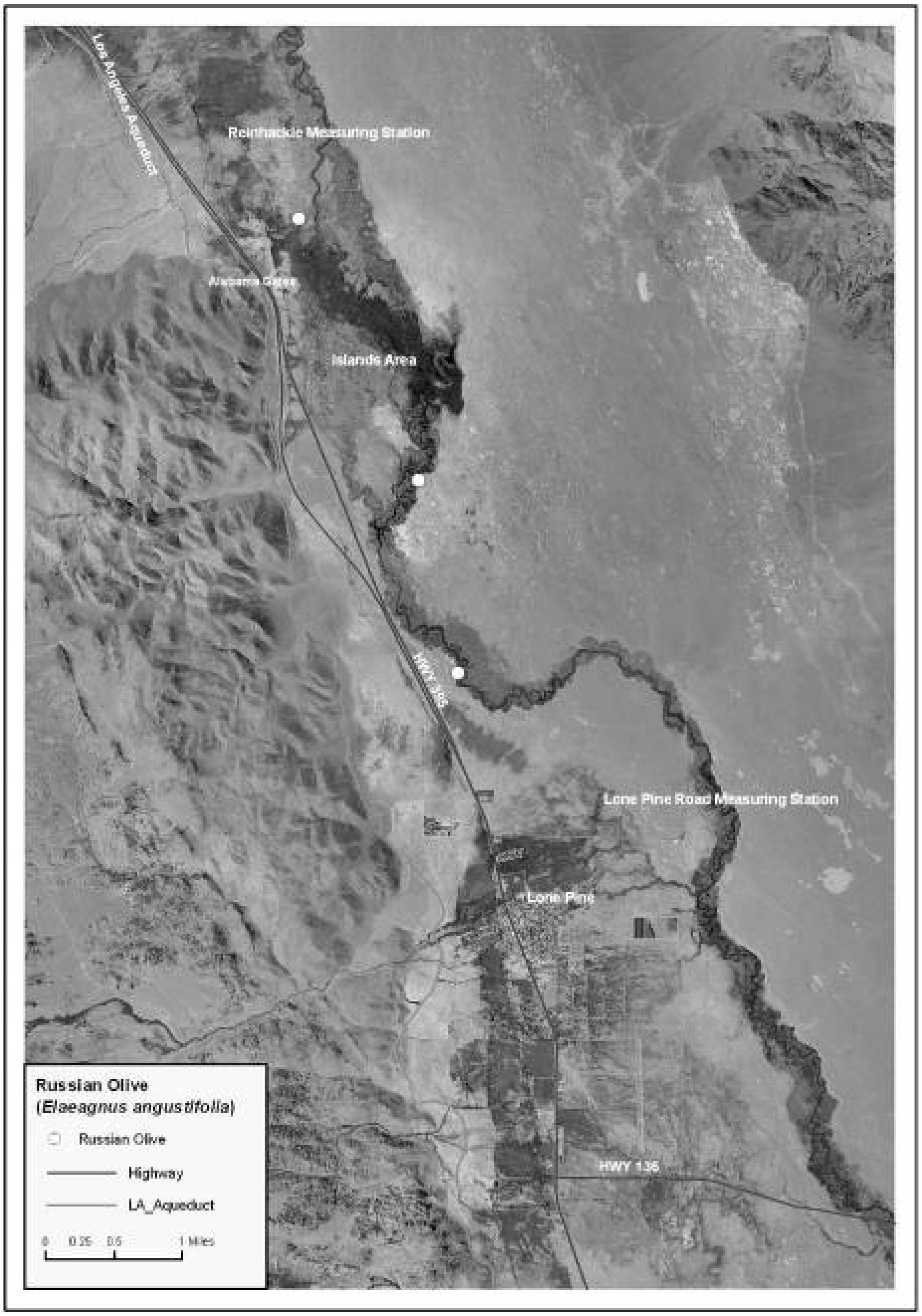
Map 4. Locations of New Roads or Preexisting Roads with Resource Impacts 2009



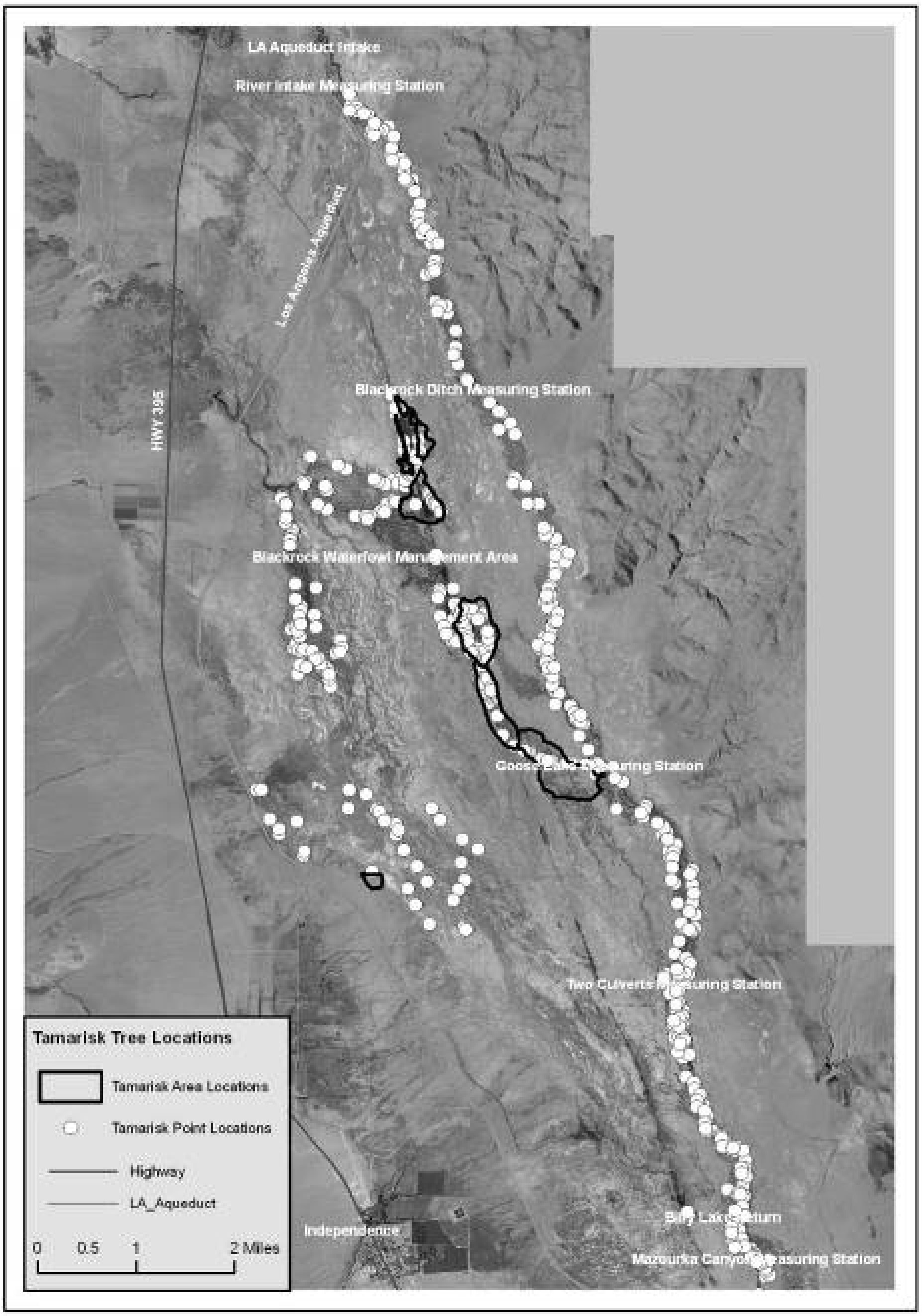
Map 5. Location of Russian Olive (*Elaeagnus angustifolia*), Upper LORP 2009



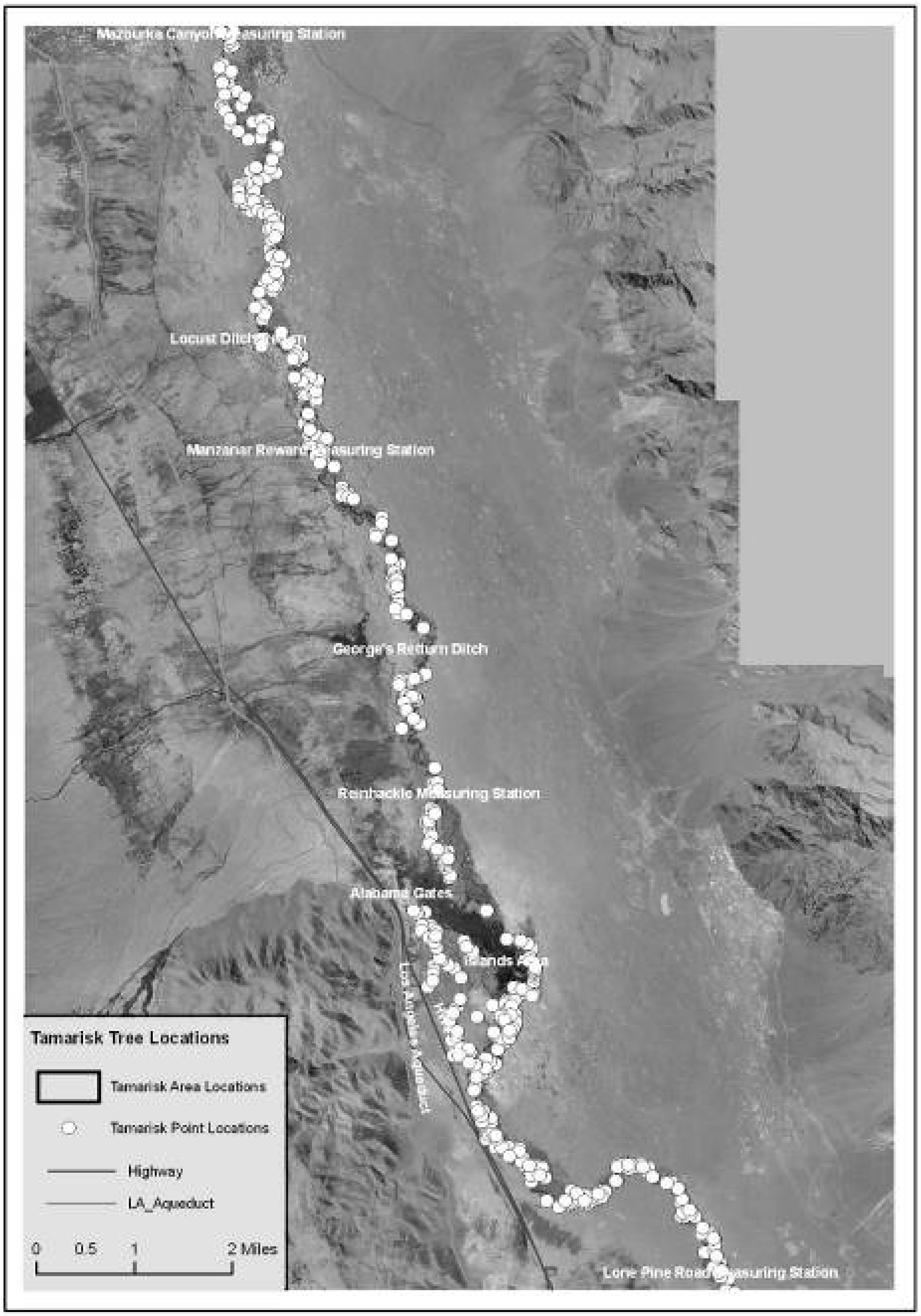
Map 6. Location of Russian Olive (*Elaeagnus angustifolia*), Central LORP 2009



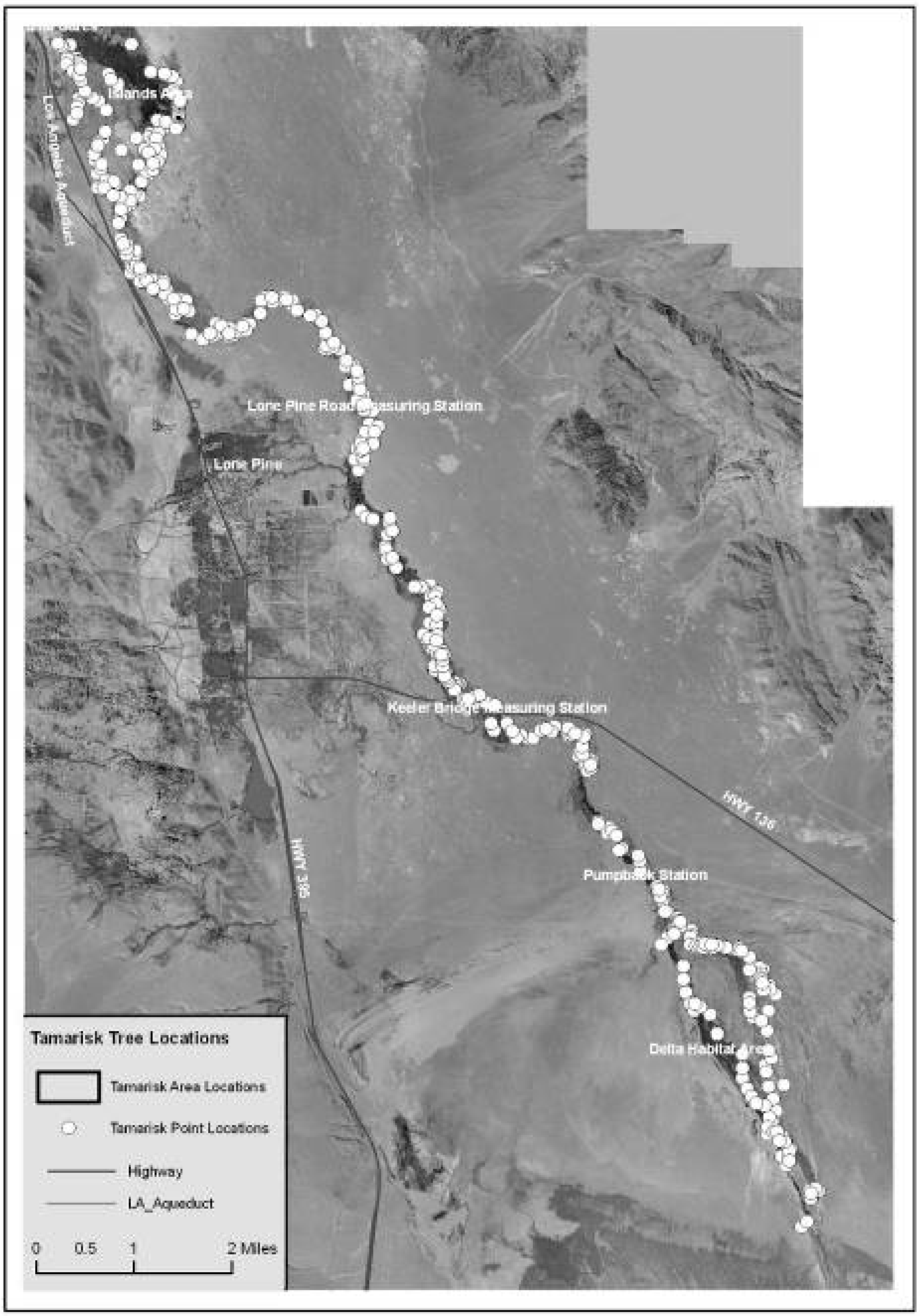
Map 7. Location of Russian Olive (*Elaeagnus angustifolia*), Lower LORP 2009



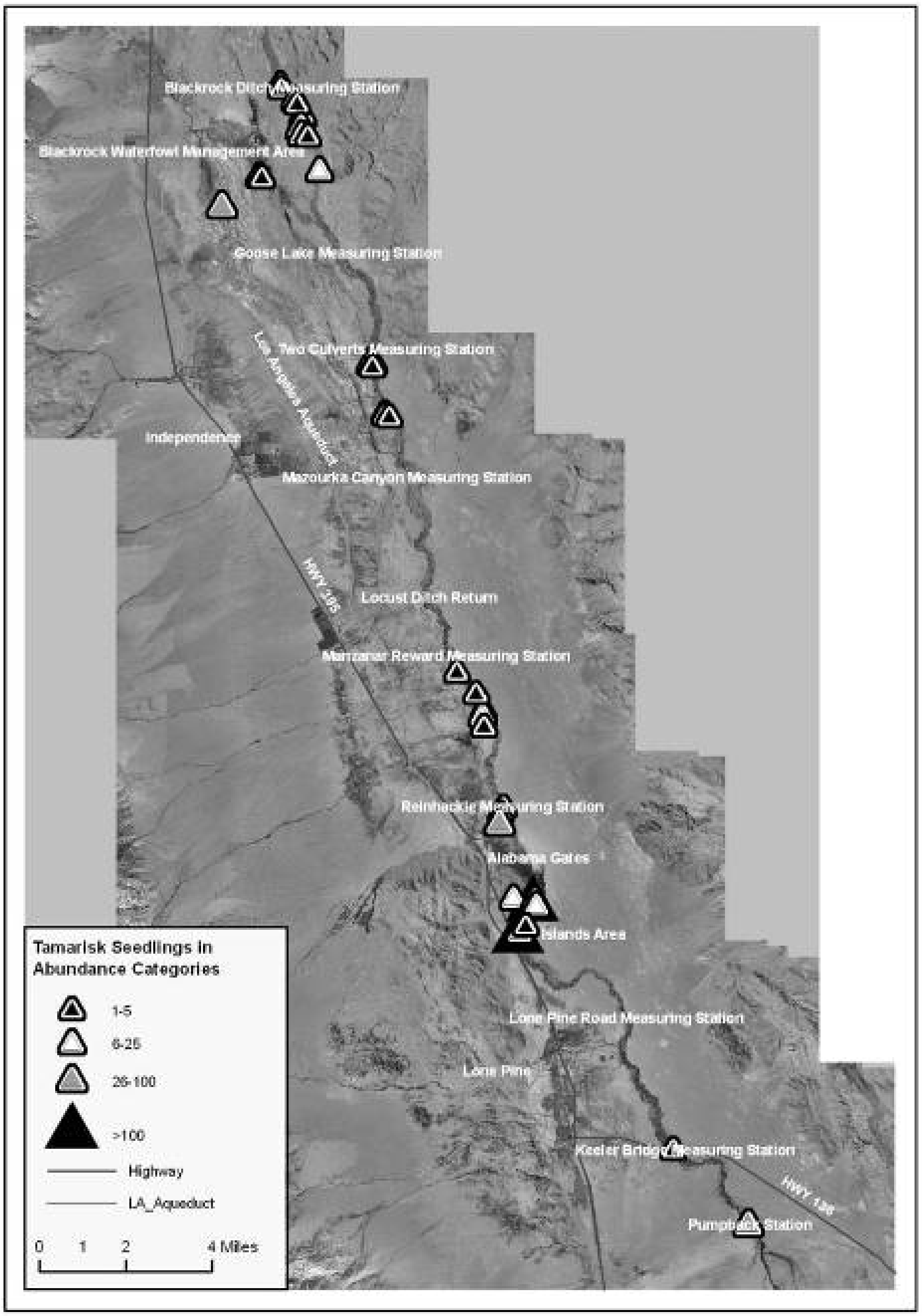
Map 8. Location of Established Tamarisk (*Tamarisk ramosissima*), Upper LORP 2009



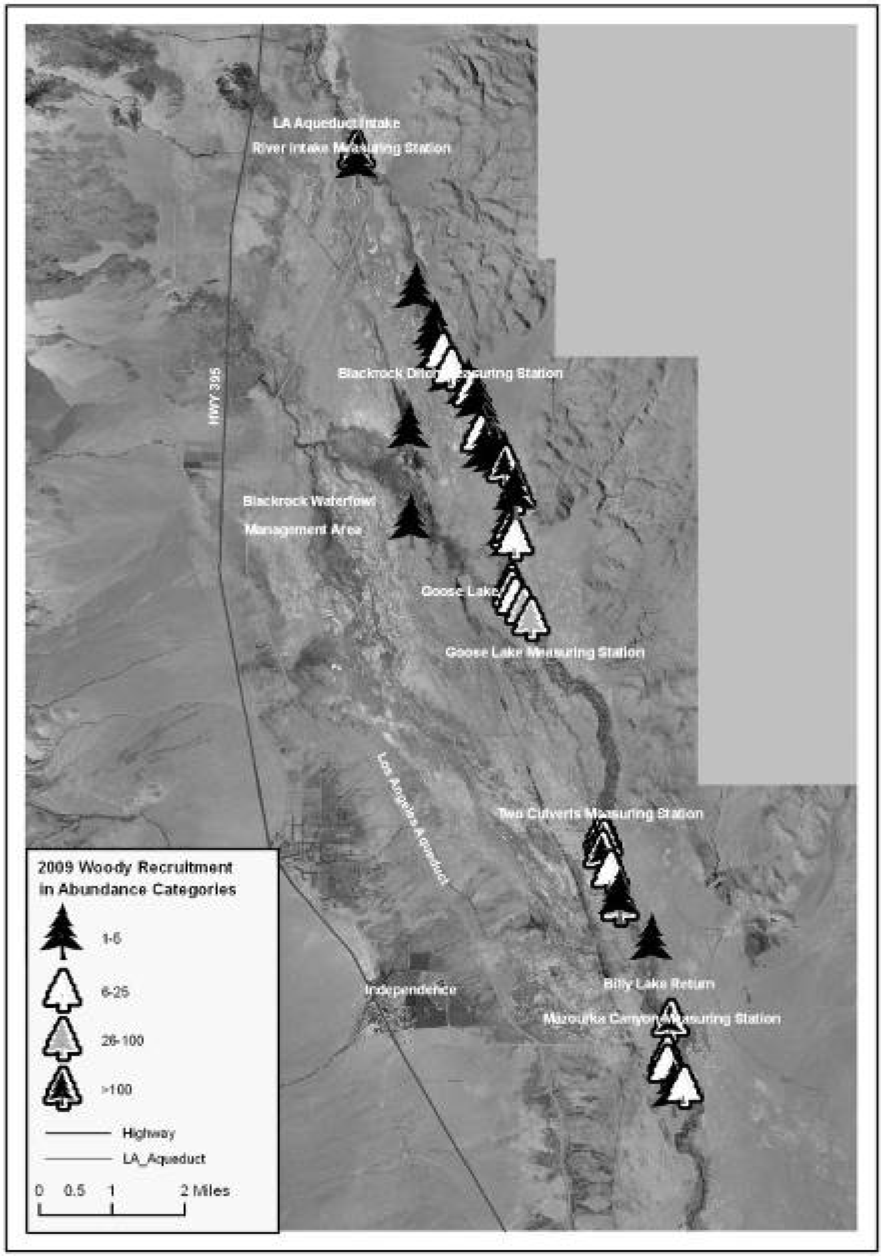
Map 9. Location of Established Tamarisk (*Tamarisk ramosissima*), Central LORP 2009



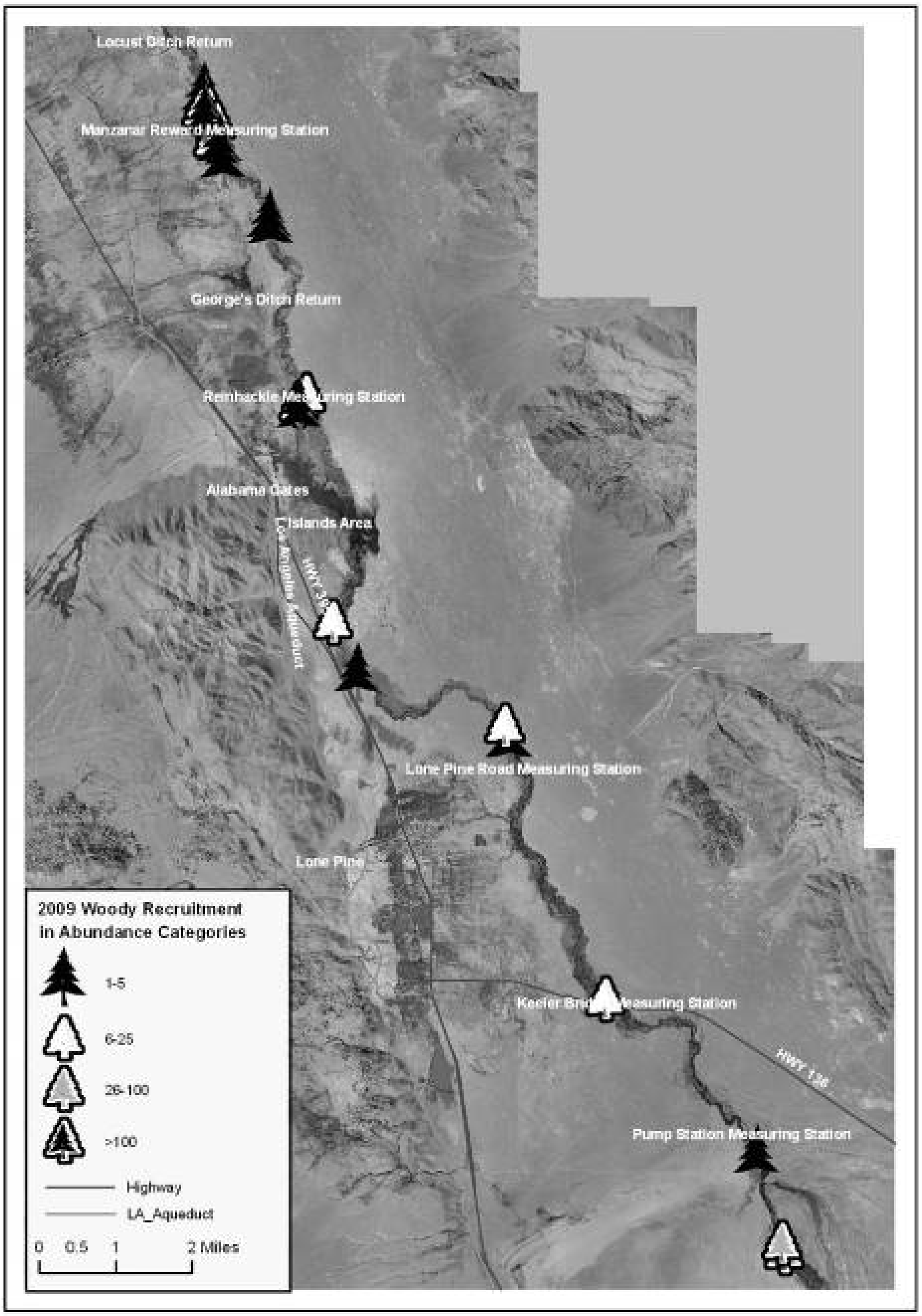
Map 10. Location of Established Tamarisk (*Tamarisk ramosissima*), Lower LORP 2009



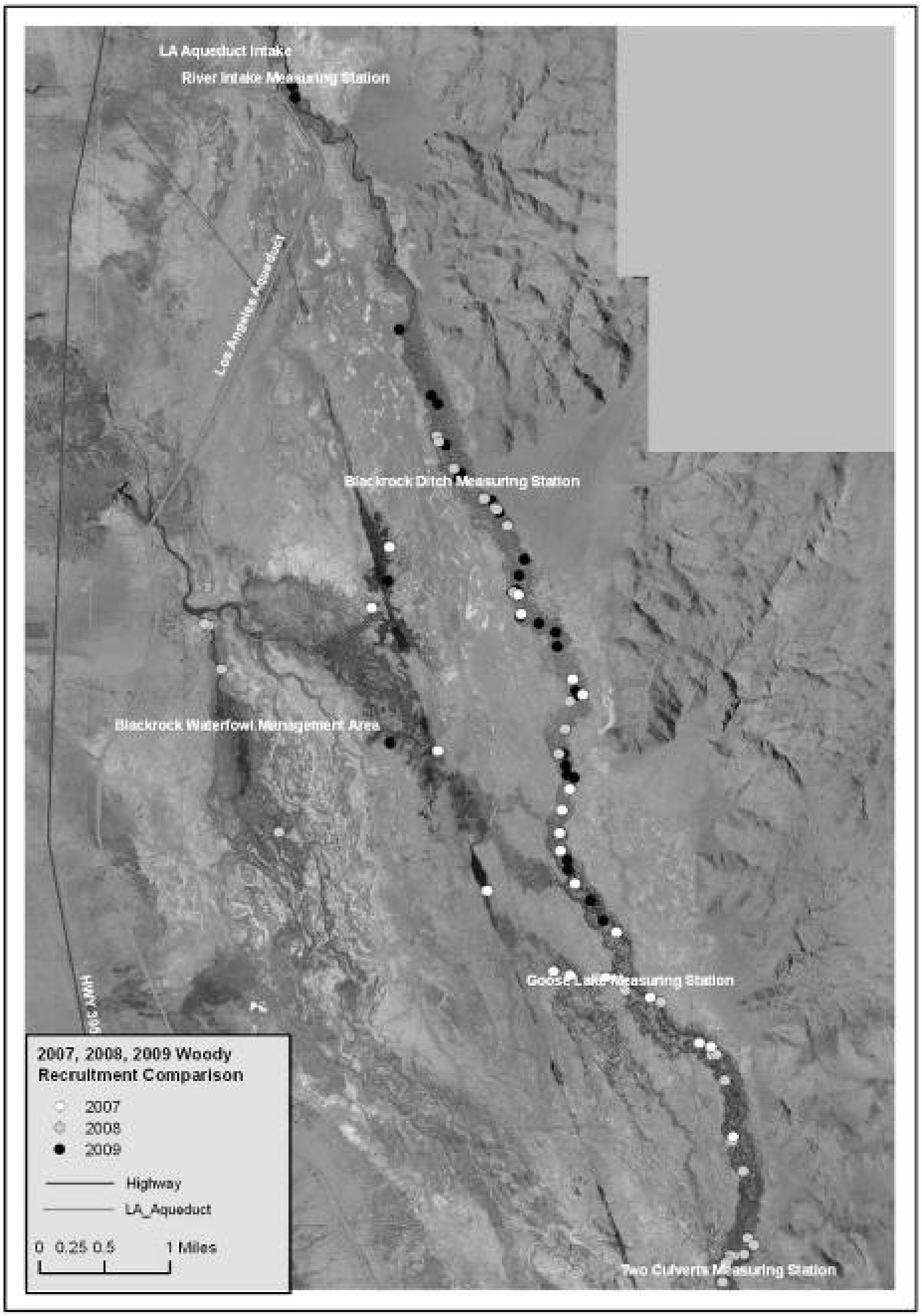
Map 11. Location of Tamarisk Seedlings 2009



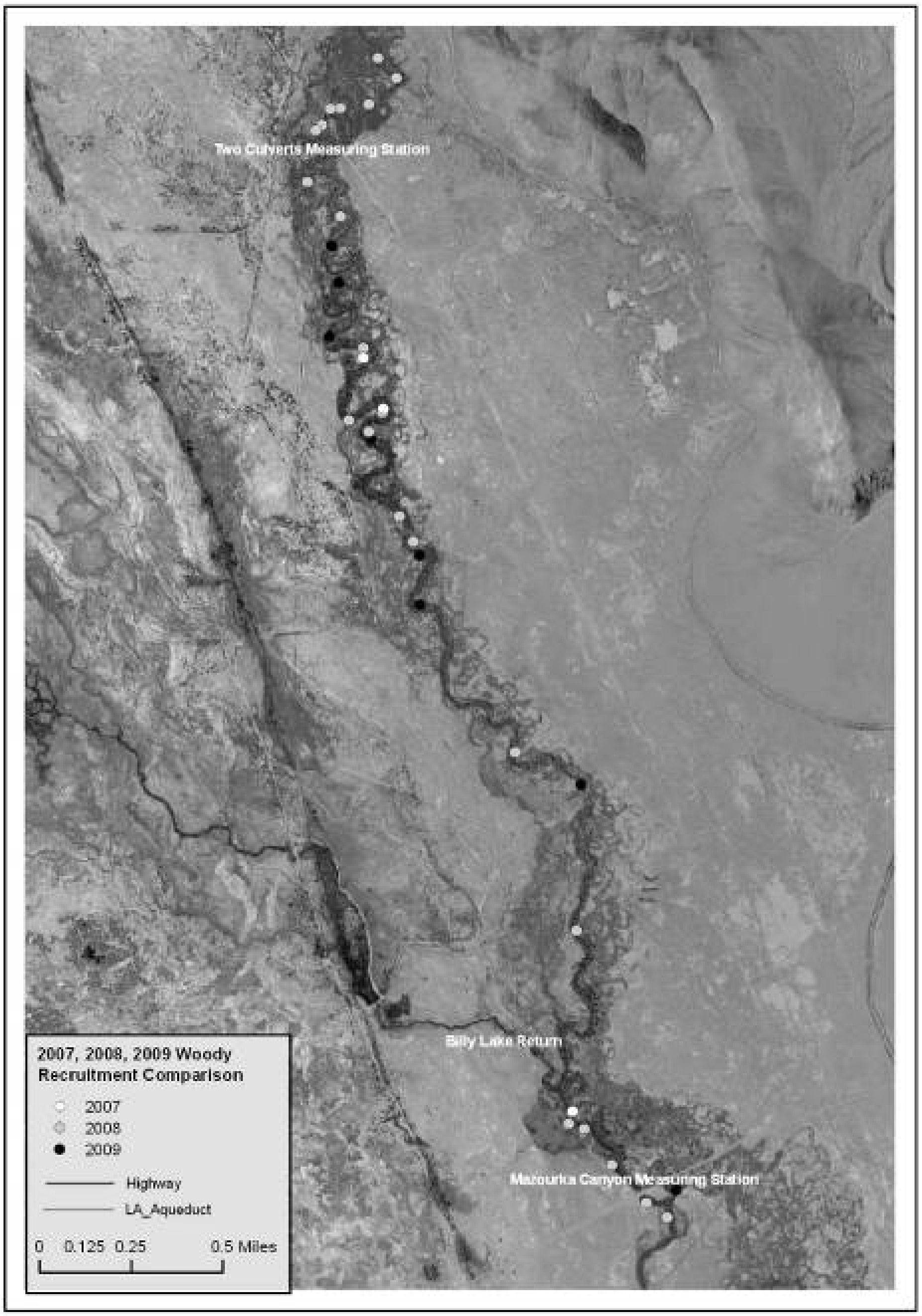
Map 12. Native Woody Riparian Species Recruitment Sites, Upper LORP 2009



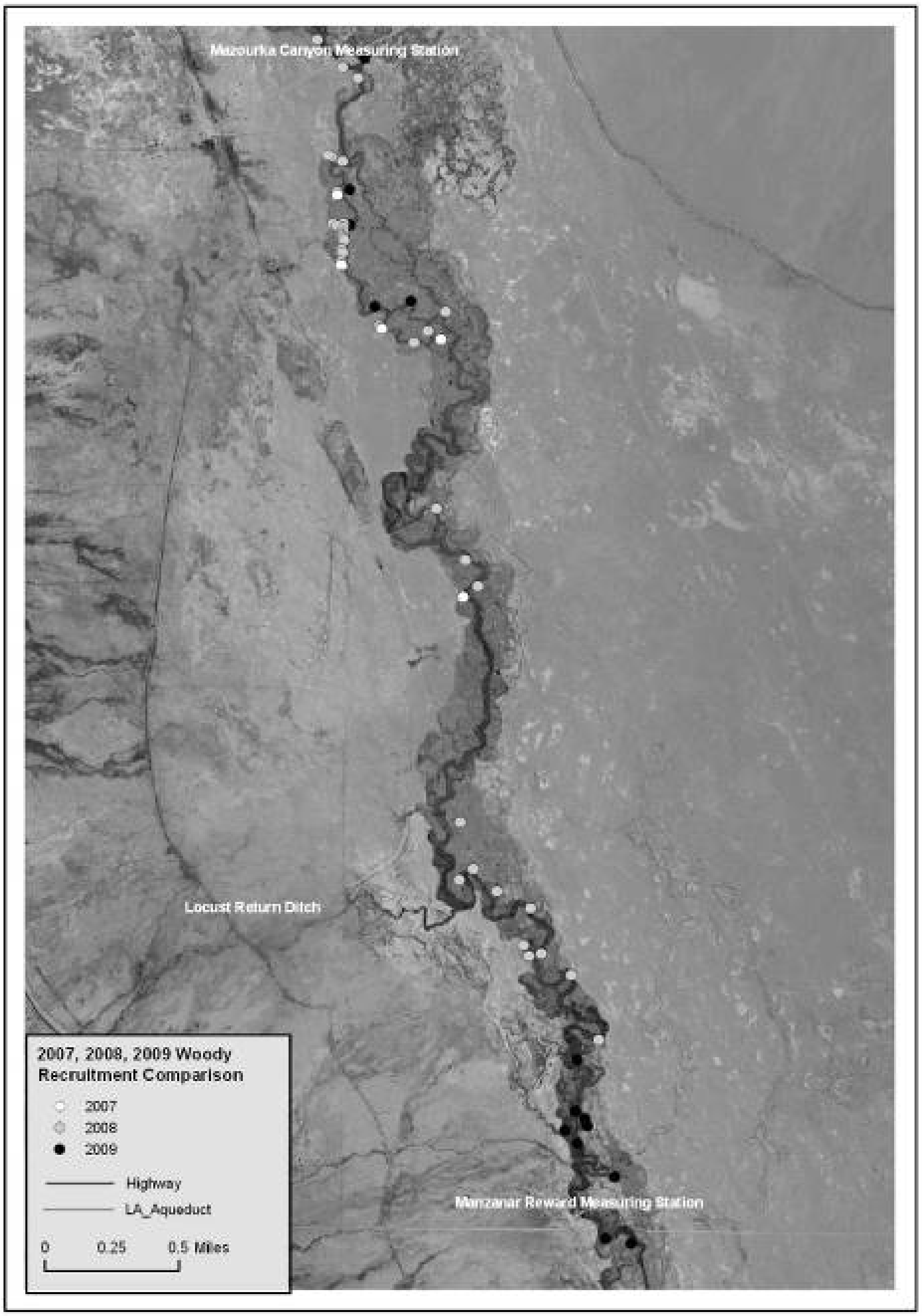
Map 13. Native Woody Riparian Species Recruitment Sites, Lower LORP 2009



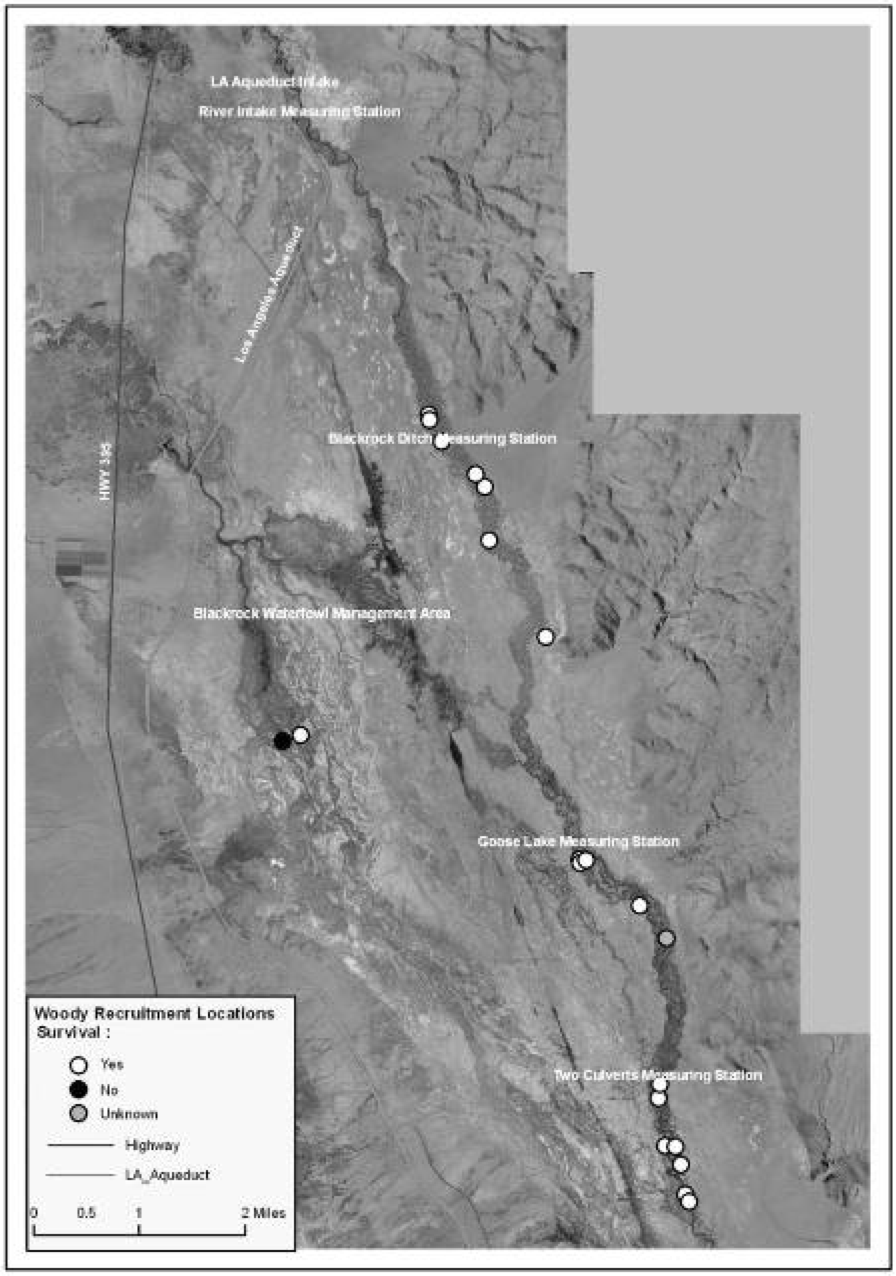
Map 14. Native Woody Riparian Species Recruitment Sites 2007-2009, Aqueduct Intake to Two Culverts



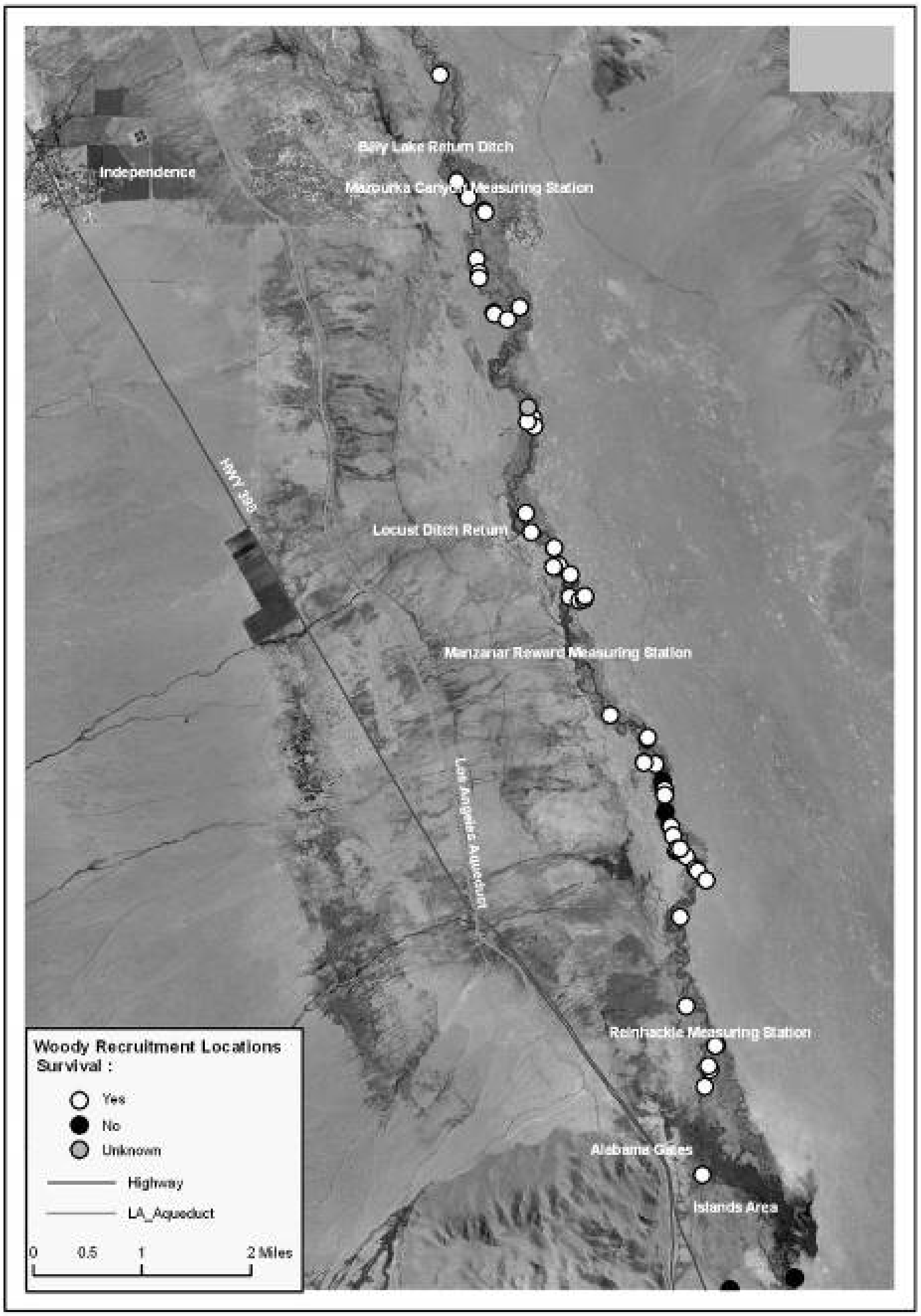
Map 15. Native Woody Riparian Species Recruitment Sites 2007-2009, Two Culverts to Mazourka Canyon Road



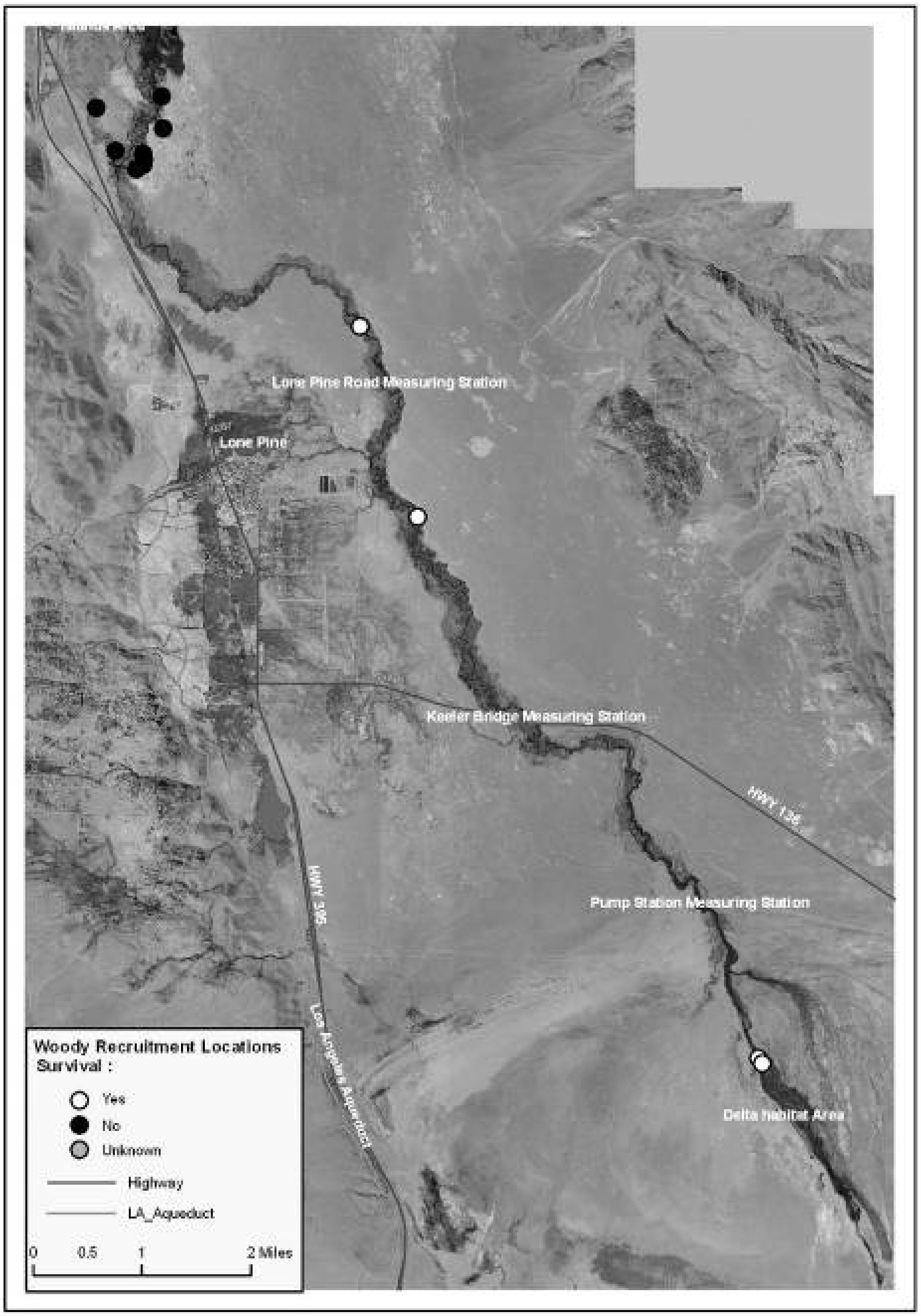
Map 16. Native Woody Riparian Species Recruitment Sites 2007-2009, Mazourka Canyon Road to Manzanar Reward Road



Map 17. Revisit Sites-Native Woody Riparian Species Recruitment Sites, Upper LORP 2009



Map 18. Revisit Sites-Native Woody Riparian Species Recruitment Sites, Central LORP 2009



Map 19. Revisit Sites-Native Woody Riparian Species Recruitment Sites, Lower LORP 2009

4.13.2. Appendix 2. Rapid Assessment Survey Tables

RAS Table 1. 2009 LORP Rapid Assessment Raw Data by Impact Type

Beaver Activity

RAS Data ID	Easting	Northing	General Survey Area	Observer Comments
RA-137	399663	4070702	River Mile 23.0	Dam in reservoir. No sign of animals
RA-136	399786	4070544	South of Mazourka Rd	Beaver dam, .5m tall, W branch
RA-105	408705	4048821	Narrow Gauge Road South	Heard tail slap and saw big ripple in river. No beaver dam in sight.

Disturbance

RAS Data ID	Easting	Northing	General Survey Area	Observer Comments
RA-119	399291	4072966	South of Mazourka Canyon Road, East side of River	road for measuring station and turnout

RAS Table 1, continued   2009 LORP Rapid Assessment Raw Data by Impact Type

Exotic Weeds					
RAS Data ID	**Easting**	**Northing**	**General Survey Area**	**Observer Comments**	**Abundance**
RA-115	392487	4092601	Intake to 2.2	GRSQ - Grindelia squarrosa. Pics are close up and general area	6-25
RA-113	392482	4092365	Intake South	on bank, gumweed	6-25
RA-113	392512	4092316	Intake South	gumweed on bank	1-5
RA-115	392575	4092310	Intake to 2.2	GRSQ - several plants along oxbow	6-25
RA-113	392824	4091907	Intake South	Gumweed around oxbow	6-25
RA-114	393925	4089648	North of Black Rock ditch	BAHY population, very decadent	>100
RA-114	393900	4089556	North of Black Rock ditch	BAHY population in upland.	>100
RA-114	394186	4088821	North of Black Rock ditch	Large BAHY population from floodplain to uplands. 3.9 river miles.	>100
RA-114	394318	4088476	North of Black Rock ditch	large BAHY population 100x100m on flood plain	>100
RA-116	394461	4087905	Intake	BAHY - dead dry, almost 100% cover inside bend for 50ft.	>100
RA-116	394476	4087898	Intake	BAHY contiunes over bend S 100ft from point.	
RA-126	394560	4087783	south from Blackrock Measuring Station	decadent Bassia covers area with some new regrowth.	
RA-126	394763	4087564	south from Blackrock Measuring Station	Phragmites stand, approx. 20m in length in channel	
RA-118	395053	4087253		Dead BAHY, takes up whole flood plain (50m-70m from river)	>100
RA-126	395159	4087011	south from Blackrock Measuring Station	5m long stretch of Phragmites	
RA-126	395123	4086985	south from Blackrock Measuring Station	Small area of Phragmites approx. 20mx10m in cut off meander bend	
RA-112	391347	4085949	Eastside of Winterton Slough	CIVU 3 plants flowering on both sides of fence	1-5
RA-112	391372	4085924	Eastside of Winterton Slough	CIVU, 3 plants flowering	1-5
RA-110	391377	4085908	Winterton Slough, west side	CIVU plants at edge of PHAU and meadow	6-25
RA-131	395567	4085820	East of Wagonner	approx. 40m long patch of phragmites in channel	
RA-131	395729	4085815	East of Wagonner	approx. 10 stalks of phragmites at edge of wetted channel	
RA-156	393736	4085691	Coyote, Goose Lake to River, West Side	bull thistle. Flowering, seed (1 plant)	1-5
RA-110	391483	4085599	Winterton Slough, west side	North of TARA, CIVU plant	1-5
RA-156	393782	4085565	Coyote, Goose Lake to River, West Side	bull thistle. S end of lower Twin, flowering, seeds	1-5
RA-156	393760	4085558	Coyote, Goose Lake to River, West Side	bull thistle. Flowering, seed	6-25
RA-118	395892	4085307		Dead BAHY approx. 2m tall, 70m long along river	>100
RA-131	395988	4085004	East of Wagonner	Phragmites patch surrounds wetted off river depression	
RA-131	396109	4084979	East of Wagonner	40m long patch of phragmites in channel	
RA-117	395723	4084206		extensive BAHY from river mile 8.9-9.25 Point on S end of polygon.	
RA-125	395924	4083889	mile 5.1	2-3 acres tall dead Basia in loop of river. Infestation starts 10m W of point.	>100
RA-117	395955	4082705		BAHY covering points. GPS point marks S end.	
RA-156	394888	4082419	Coyote, Goose Lake to River, West Side	bull thistle at wooden wier between upper and lower Goose Lake	
RA-156	396453	4081539	Coyote, Goose Lake to River, West Side	impenetrable BAHY along Goose Lake return to river	>100
RA-122	396594	4081211	Goose return to two culverts.	Solid BAHY, SATR12, ATTO, SAVE, SUMO. Was not able to get close to the river.	
RA-141	391165	4081170	Thibaut Ponds	bull thistle E391165 N4081171	6-25
RA-141	391050	4081126	Thibaut Ponds	curlycup gumweed infestation E391051 N4081128	>100
RA-155	391004	4081109	Thibaut - rare plant exclosure - West side	outbreak GRSQ along ditch, from spillway to E. 1000's of plants	>100
RA-155	391036	4080923	Thibaut - rare plant exclosure - West side	GRSQ outbreak along entire reach of ditch from spillway S. Point taken only to locate ditch	>100
RA-150	392983	4080796	Thibaut	many PHAU stands here	>100
RA-151	391470	4080783	Thibaut Unit, BWMA	1-2 bull thistle among small patch of gumweed	1-5
RA-155	391383	4080706	Thibaut - rare plant exclosure - West side	point centered in hot spot. See map. GRSQ	>100
RA-129	397745	4080620	4 miles north of 2 culverts	Impenetrable Bassia/ Dense. Up to 8ft high	
RA-150	393295	4080387	Thibaut	4 PHAU stands on edge of dry basin	>100
RA-151	393528	4079704	Thibaut Unit, BWMA	scattered gumweed patches at basins and ditches throughout area	
RA-151	393727	4079122	Thibaut Unit, BWMA	gumweed along old ditch. Not dense.	>100
RA-150	394225	4078898	Thibaut	gumweed on SW edge of flooded area (now dry)	>100
RA-150	394337	4078854	Thibaut	gumweed covers entire permiter of dry basin. See map.	
RA-150	394337	4078854	Thibaut	gumweed at S end of flooded area	>100
RA-150	394022	4078701	Thibaut	GRsp. Gumweed in dry ditch near FOSP	>100
RA-104	398040	4076974	Two Culverts to Mazourka	GRSQ patch approx. 4m from river	
RA-124	398972	4074382	South of Mazourka	large patch of BAHY/SATR, whole inside bend of river. Patches of last years growth and patches of this years	>100
RA-104	398995	4074339	Two Culverts to Mazourka	GRSQ patch on river	
RA-124	398254	4074221	South of Mazourka	Acacia sp. (white thorn) by Billy Lake	1-5
RA-124	398911	4074122	South of Mazourka	big clone of phragmites along river (goes 50m in)	>100
RA-124	398826	4073778	South of Mazourka	PHAU dense stand	
RA-124	399359	4073216	South of Mazourka	8 acacias, whitethorn/ TARA seedlings	
RA-119	399266	4073043	South of Mazourka Canyon Road	ROPS/ELAN population in flood plain	6-25
RA-135	400598	4067232	above and below manzanar reward rd.	large patch of Phragmites (40x20m) toward the margin of flood plain	>100
RA-135	400656	4067150	above and below manzanar reward rd.	large patch of Phragmites (100x30m) from near 7.2 miles to W (margin of floodplain)	>100
RA-135	400588	4066966	above and below manzanar reward rd.	large patch of Phragmites along the edge of flood plain; N of the confluence along with SAEX	>100
RA-135	400639	4066795	above and below manzanar reward rd.	Phragmites along the margin of floodplain (bottom of the drop down). Very wet	>100

RAS Table 1, continued 2009 LORP Rapid Assessment Raw Data by Impact Type

Exotic Weeds (continued)					
RAS Data ID	**Easting**	**Northing**	**General Survey Area**	**Observer Comments**	**Abundance**
RA-135	400701	4066771	above and below manzanar reward rd.	Phragmites, 30x50m	>100
RA-135	400645	4066731	above and below manzanar reward rd.	along the drop down into floodplain. Hear some sort of wash or drain.	26-100
RA-135	400629	4066541	above and below manzanar reward rd.	Phragmites along the drop down and wash coming from W	26-100
RA-135	400806	4066333	above and below manzanar reward rd.	Phragmites along river margin 5x5m	26-100
RA-135	400939	4066119	above and below manzanar reward rd.	Phragmites along the old channel 5x30m	>100
RA-135	400918	4066035	above and below manzanar reward rd.	Phragmites, large patch along old channel running toward/along western margin of flood plain.	>100
RA-135	400951	4065924	above and below manzanar reward rd.	Phragmites along oxbow lake	26-100
RA-135	400989	4065889	above and below manzanar reward rd.	small patch of Phragmites along the hoot hill.	6-25
RA-128	402035	4064950	south of Manzanar Reward Road	large stand of PHAU	>100
RA-128	402096	4063837	south of Manzanar Reward Road	small PHAU stand	>100
RA-138	402491	4061998	south of manzanar reward rd	PHAU stand	>100
RA-138	402365	4061780	south of manzanar reward rd	PHAU stand	>100
RA-138	402556	4061603	south of manzanar reward rd	PHAU stand	>100
RA-138	402623	4061463	south of manzanar reward rd	PHAU stand	>100
RA-138	402622	4061463	south of manzanar reward rd	PHAU stand	>100
RA-138	402651	4061422	south of manzanar reward rd	PHAU stand	>100
RA-138	402724	4061312	south of manzanar reward rd	PHAU stand	>100
RA-133	402702	4061127	South Manzanar to Islands	large clone of PHAU, see map	
RA-139	403731	4056872	Islands	5 mature plants. CIVU. 1m from water	1-5
RA-144	403895	4056846	Islands	Phragmities 5x30m along the river margin	26-100
RA-144	403838	4056831	Islands	bull thistle along milkweed/JUBA/LETR	26-100
RA-144	403833	4056820	Islands	Phragmites 20x40m along the flood plain margin	>100
RA-147	408542	4050001	Lone Pine	PHAU stand	1-5
RA-147	408599	4049460	Lone Pine	Bull thistle	1-5
RA-149	411121	4047190	Below Hwy 136 to pumpback	bull thistle in channel, flowering and setting seed	1-5
RA-154	412509	4044322	Delta east side	Phragmities 5x40m along the wetted edge	>100
RA-154	412794	4044238	Delta east side	Phragmites among Tules along wetted edge of side channel	26-100

Fencing				
RAS Data ID	Easting	Northing	General Survey Area	Observer Comments
RA-119	400122	4071506	South of Mazourka Canyon Road	Old fence with barbed wire
RA-135	400683	4066429	above and below manzanar reward rd.	fence along road (approx. 10m W from river). Cut for river access from W.
RA-142	403399	4055777	South of islands	fence on floodplain, did not see it on map. Runs E and W. Looks like an old 3-wire fence.

Grazing				
RAS Data ID	Easting	Northing	General Survey Area	Observer Comments
RA-138	402708	4060524	south of manzanar reward rd	cattle grazing in area. Trails and footprints in mud. Willows grazed
RA-138	402777	4059943	south of manzanar reward rd	cattle sign along two-track, see photo
RA-149	410464	4047658	Below Hwy 136 to pumpback	compaction/denuded veg by livestock.

RAS Table 1, continued   2009 LORP Rapid Assessment Raw Data by Impact Type

Noxious Weeds					
RAS Data ID	**Easting**	**Northing**	**General Survey Area**	**Observer Comments**	**Abundance**
RA-114	393907	4089626	North of Black Rock ditch	LELA population. Untreated. See Nox weed form.	26-100
RA-114	393926	4089306	North of Black Rock ditch	LELA within river channel	
RA-116	393892	4089284	Intake	a small patch of LELA on the river bank. Plants are pulled, but should revisit site.	6-25
RA-116	394152	4088777	Intake	(NAD27) E394193 N4088876, Approx 18 plants.	6-25
RA-116	394190	4088751	Intake	(NAD27) E394152 N4088777, Approx 5 plants almost in water	1-5
RA-116	394300	4088513	Intake	(NAD27) E394301 N4088513, Approx 10 LELA plants in water	6-25
RA-116	394302	4088425	Intake	(NAD27) E394302 N4088425 10 LELA plants in water, 3 on bank. 10m downstream, 2 plants in water. Next to slash at point 037.	6-25
RA-114	394270	4088384	North of Black Rock ditch	LELA infestation within river	1-5
RA-114	394569	4087812	North of Black Rock ditch	LELA infestation along river bank at 4.90 miles	>100
RA-126	394570	4087761	south from Blackrock Measuring Station	4 LELA at muddy margin; 3 basal leaves only, one close to flowering; new site.	1-5
RA-126	394579	4087699	south from Blackrock Measuring Station	20m long dense patch of LELA at rivers edge, steep bank. Treated with resprouts.	>100
RA-126	395228	4086265	south from Blackrock Measuring Station	Approx. 15m long patch of LELA at edge of water between old Bassia and Typha	>100
RA-131	395443	4085894	East of Wagonner	Lepidium latifolium growing at rivers edge (now flooded) starting to colonize adjacent drier area up hill	>100
RA-110	392007	4083137	Winterton Slough, west side	LELA plants flowering and rosettes, 25 plts	6-25
RA-135	401469	4065319	above and below manzanar reward rd.	between oxbow in river toward the gate (S) among LETR in moist meadow/S of BAHY patch. LELA 2x5m	26-100
RA-146	402006	4065021	below manzanar reward, east side	25+ LELA setting seed. 15m N of river channel. Is saturated side channel	6-25
RA-146	402394	4063600	below manzanar reward, east side	LELA on bank and flood plain. Flowering and setting seed. Untreated.	26-100
RA-146	402655	4063499	below manzanar reward, east side	LELA in channel/bank. Flowering and setting seed. Untreated.	26-100
RA-146	402761	4063440	below manzanar reward, east side	flowering/setting seed LELA on W side of oxbow.	1-5

Recreation				
RAS Data ID	Easting	Northing	General Survey Area	Observer Comments
RA-122	397867	4078104	Goose return to two culverts.	campfire ring along road at Two Culverts
RA-134	397894	4078068	Goose return to two culverts.	rock fire ring, trash. Just S of two culverts
RA-106	411318	4046241	Between 138 and pumpback, The end	Burn scars on ground along bank, small trash too. Campsite recently used.

RAS Table 1, continued   2009 LORP Rapid Assessment Raw Data by Impact Type

Roads				
RAS Data ID	**Easting**	**Northing**	**General Survey Area**	**Observer Comments**
RA-113	392745	4092169	Intake South	Ruts, road was driven on for construction, continued use, needs to be closed off, spurs off from Pole Line Rd.
RA-113	392788	4092004	Intake South	Existing road partially flooded, vehicles may drive on grass to avoid flooding, some new rutting and widening, new road going around powerline area
RA-113	393188	4091509	Intake South	Old road perhaps from construction, rehab road, no resource issues
RA-126	394699	4087614	south from Blackrock Measuring Station	Old road crossing river still barren, not recovering
RA-118	396131	4085000		road appears to be in use, not in floodplain
RA-124	399279	4073143	South of Mazourka	flooded road in floodplain
RA-135	400671	4066762	above and below manzanar reward rd.	old road. Entrance into floodplain blocked. Not used for a while. A beer bottle was found - indicates some traffic.
RA-130	400719	4066678	south of mazourka canyon rd.	road tracks adjacent to river. No recent use, may be 1 year old.
RA-133	402157	4062733	South Manzanar to Islands	Arizona crossing of George's creek, heavy use
RA-133	402386	4061634	South Manzanar to Islands	road ending at a fishing spot - some trash
RA-138	402777	4059943	south of manzanar reward rd	2 track heading into Tules, see photo
RA-144	404324	4058373	Islands	established road with recent tracks of tires
RA-143	402431	4057898	Islands, west side	new spring developing where power line road meets 395
RA-144	404118	4057673	Islands	old track of tires over a once wet area. Shotgun shells along the track
RA-144	403970	4056840	Islands	tire marks recent
RA-148	407952	4049775	Narrow guage rd south	gate with no road opened. Tracks from truck with mud tires passing through. Do not know why gate is there. Gate needs lock.
RA-105	408569	4049054	Narrow Gauge Road South	comes down from the bluff and leads straight to the river.
RA-106	411807	4045646	Between 138 and pumpback, The end	Muddy tire tracks in flood plain, just one use.
RA-154	412510	4044308	Delta east side	unestablished road going through shrubs towards wetted edge from the road along power line. Fresh tracks.
RA-154	412515	4044270	Delta east side	multiple pathways. Sign that someone got stuck. Some traffic.
RA-152	412500	4043845	Delta	1 set of tracks in sand
RA-152	414159	4040875	Delta	road continued
RA-152	414418	4040219	Delta	many tracks just off berm going N.
RA-152	414709	4039584	Delta	tracks along edge of wetland. Tracks made by truck.

RAS Table 1, continued 2009 LORP Rapid Assessment Raw Data by Impact Type

Russian Olive					
RAS Data ID	Easting	Northing	General Survey Area	Observer Comments	Abundance
RA-116	393633	4090611	Intake	juvenile - likely to drown.	1-5
RA-116	393923	4089804	Intake	juvenile, on river bank	1-5
RA-111	393308	4087470	Eastside of Upper Twin Lake	2 resprouts from fire, March 2009	1-5
RA-109	393281	4087377	North Twin Lake, west side	1 plant 2m tall, resprout from fire. Approx. 6 seedlings nearby also	1-5
RA-111	393631	4087114	Eastside of Upper Twin Lake	4 resprouts from fire, March 2009	1-5
RA-111	393630	4087010	Eastside of Upper Twin Lake	1 resprout from fire, March 2009	1-5
RA-111	393630	4086909	Eastside of Upper Twin Lake	3 resprouts from fire, March 2009	1-5
RA-109	393450	4086720	North Twin Lake, west side	1 resprout, 4 seedlings	1-5
RA-109	393459	4086701	North Twin Lake, west side	1 robust seedling, 1m tall	1-5
RA-111	393648	4086687	Eastside of Upper Twin Lake	+15 resprouts from fire, March 2009	6-25
RA-109	393404	4086582	North Twin Lake, west side	1 resprout, 1m tall	1-5
RA-109	393361	4086503	North Twin Lake, west side	2 resprouts, approx 15 seedlings, all >1m tall	6-25
RA-111	393621	4086491	Eastside of Upper Twin Lake	resprout from fire, March 2009	1-5
RA-111	393621	4086473	Eastside of Upper Twin Lake	3-5 plants, <2m tall along tules	1-5
RA-111	393644	4086471	Eastside of Upper Twin Lake	resprout from fire, March 2009	1-5
RA-109	393378	4086440	North Twin Lake, west side	1 resprout 3m tall, 3 seedlings 1m tall	1-5
RA-109	393457	4086342	North Twin Lake, west side	1 small resprout 1m tall	1-5
RA-109	393409	4086331	North Twin Lake, west side	1 resprout 1m tall, 20 seedlings, >1m tall	6-25
RA-109	393503	4086330	North Twin Lake, west side	1 resprout 1m tall	1-5
RA-109	393432	4086325	North Twin Lake, west side	2 resprouts 1-2m tall, 10 seedlings 1m tall	6-25
RA-109	393603	4086319	North Twin Lake, west side	1 robust resprout 2m tall	1-5
RA-156	393671	4086309	Coyote, Goose Lake to River, West Side	1 ELAN 20m S of Blackrock ditch	1-5
RA-126	395169	4086307	south from Blackrock Measuring Station	one young and 4 established plants; 2 in Typha	1-5
RA-126	395248	4086280	south from Blackrock Measuring Station	2 saplings on muddy and sandy point bar	1-5
RA-126	395260	4085930	south from Blackrock Measuring Station	1 sapling in water, pulled	1-5
RA-131	395727	4085650	East of Wagonner	3 saplings in edge of bank, 1 seedling pulled	1-5
RA-121	392854	4085423	Waggoner	resprout	1-5
RA-110	391456	4084963	Winterton Slough, west side	plant 3m E of GPS point, 6m tall, fruiting	1-5
RA-112	391836	4084906	Eastside of Winterton Slough	Single plant. Lots of elk rubs	1-5
RA-110	391725	4084052	Winterton Slough, west side	2m tall plant, pretty burnt up, looks mostly dead	1-5
RA-125	395831	4083781	mile 5.1	1 plant in water, 2nd plant 15m downstream (both <1m tall), also +1yr SALA3 adjacent, 1 TARA plant, +1yr SALA3 15m downstream	1-5
RA-125	395817	4083662	mile 5.1	1 plant, <1m tall on sand bar	1-5
RA-110	391831	4083426	Winterton Slough, west side	3m tall plant, 4m S of GPS point	1-5
RA-112	392294	4083365	Eastside of Winterton Slough	1 plant at pond edge	1-5
RA-110	392018	4083282	Winterton Slough, west side	At least 2 plants SE of GPS point	1-5
RA-112	392024	4083257	Eastside of Winterton Slough	2 ELAN <2m on east side of ditch on gravel berms	1-5
RA-156	395195	4081986	Coyote, Goose Lake to River, West Side	1 ELAN on lower Goose Lake E bank	1-5
RA-156	395263	4081847	Coyote, Goose Lake to River, West Side	mature ELAN along Goose Lake return	1-5
RA-141	391165	4081170	Thibaut Ponds	South 4 mature trees	1-5
RA-155	391315	4081133	Thibaut - rare plant exclosure - West side	plants located along ditch heading E for approx. 750m	26-100
RA-155	391047	4081118	Thibaut - rare plant exclosure - West side	6ft tall on ditch	1-5
RA-155	391160	4081098	Thibaut - rare plant exclosure - West side	5 plants 2-4m tall	1-5
RA-155	390985	4081005	Thibaut - rare plant exclosure - West side	2 plants (2-3m) one on fence line, other on ditch	1-5
RA-155	391474	4080893	Thibaut - rare plant exclosure - West side	approx. 3m tall	1-5
RA-155	391131	4080809	Thibaut - rare plant exclosure - West side	ELAN located both sides of ditch from GPS point to S	6-25
RA-151	391620	4080783	Thibaut Unit, BWMA	4 young plants to 1m high	1-5
RA-151	391659	4080781	Thibaut Unit, BWMA	1 young plant	1-5
RA-151	391677	4080732	Thibaut Unit, BWMA	4 young plants approx. 0.8m high	1-5
RA-151	391673	4080673	Thibaut Unit, BWMA	1 sapling approx. 1m high	1-5
RA-151	392482	4080425	Thibaut Unit, BWMA	sapling approx. 0.5m high	1-5
RA-151	392229	4080320	Thibaut Unit, BWMA	1 young tree approx. 1m high	1-5
RA-151	392273	4079973	Thibaut Unit, BWMA	1 sapling approx. 1m tall	1-5
RA-151	393135	4079948	Thibaut Unit, BWMA	healthy plant approx. 1.7m high	1-5
RA-151	393465	4079783	Thibaut Unit, BWMA	decadent but resprouting	1-5
RA-151	392900	4079779	Thibaut Unit, BWMA	mature trees in vicinity of now dry ditch.	1-5
RA-151	392989	4079776	Thibaut Unit, BWMA	sapling approx. 0.5m high; near area with many young TARA	1-5
RA-151	393528	4079704	Thibaut Unit, BWMA	2 decadent plants resprouting, 2m high	1-5
RA-151	393628	4079498	Thibaut Unit, BWMA	decadent plant resprouting, approx. 1.5m high	1-5
RA-151	393691	4079184	Thibaut Unit, BWMA	large healthy plant along dry ditch; 2 younger plants within 100m to the N.	1-5
RA-104	397920	4077342	Two Culverts to Mazourka	3 plants in the same area as SAGO, 1-2m tall	1-5
RA-127	397875	4077296	2 culverts to mazourka canyon	Numerous large trees in area of peninsula	6-25
RA-127	397888	4077155	2 culverts to mazourka canyon	Large plant, several in vicinity dead. Several small trees as well.	1-5
RA-127	397872	4077051	2 culverts to mazourka canyon	Approx. 10 large trees on water edge	6-25
RA-127	397987	4076973	2 culverts to mazourka canyon	2 age classes (Large 20' trees and established trees 5-6')	6-25
RA-127	397929	4076894	2 culverts to mazourka canyon	11 large trees in area	6-25
RA-127	398064	4076775	2 culverts to mazourka canyon	along river in area of point approx. 10 at 12'	6-25
RA-127	397920	4076772	2 culverts to mazourka canyon	2 trees; 1 12' tall, 1 25' tall	1-5
RA-127	398006	4076662	2 culverts to mazourka canyon	6 large trees along river 20' tall, 2 6' to S	6-25
RA-104	398060	4076656	Two Culverts to Mazourka	2 plants less than 1m tall.	1-5

RAS Table 1, continued   2009 LORP Rapid Assessment Raw Data by Impact Type

Russian Olive (continued)					
RAS Data ID	**Easting**	**Northing**	**General Survey Area**	**Observer Comments**	**Abundance**
RA-132	398282	4076109	South of two culverts	17 juvenile - mature ELAN trees along bank from here to GPS point 020	6-25
RA-104	398317	4075925	Two Culverts to Mazourka	2 plants less than 1m tall	1-5
RA-132	398228	4075909	South of two culverts	17 juvenile - mature ELAN trees along bank starting at GPS point 019 and ending here	6-25
RA-132	398348	4075905	South of two culverts	20-30 ELAN from seedlings to mature trees from GPS point 021 to here	26-100
RA-132	398279	4075888	South of two culverts	20-30 ELAN from seedlings to mature trees from here to GPS point 022	26-100
RA-132	398352	4075814	South of two culverts	1 mature ELAN on bank	1-5
RA-132	398376	4075751	South of two culverts	approx. 13 ELAN trees from here to GPS point 025	6-25
RA-132	398365	4075690	South of two culverts	approx. 13 ELAN trees from GPS point 024 to here	6-25
RA-132	398372	4075570	South of two culverts	approx. 23 ELAN along bank, most mature, some juvenile from here to GPS point 029	6-25
RA-132	398516	4075475	South of two culverts	approx. 23 ELAN along bank, most mature, some juvenile from GPS point 027 to here	6-25
RA-132	398550	4075466	South of two culverts	6 ELAN seedlings on bank	6-25
RA-132	398645	4075396	South of two culverts	approx. 15 ELAN trees along channel from here to GPS point 032	6-25
RA-132	398646	4075270	South of two culverts	approx. 15 ELAN trees along channel from GPS point 031 to here	6-25
RA-132	398763	4075213	South of two culverts	20+ mature ELAN and many seedlings along river from here to GPS 037	26-100
RA-132	398704	4075210	South of two culverts	2 ELAN trees along channel	1-5
RA-132	398896	4075184	South of two culverts	20+ mature ELAN and many seedlings along river from GPS point 034 to here	26-100
RA-123	398967	4074807	In between two culverts and Mazourka	2 plants on W river bank. Many others from 19.7miles to here in the channel but are dead.	1-5
RA-124	398931	4074482	South of Mazourka	dead standing in water in river, a few more down river	6-25
RA-124	398962	4074065	South of Mazourka	1 year plant	1-5
RA-124	398694	4073998	South of Mazourka	Along Billy return (1 young & 1 adult)	1-5
RA-119	399356	4073336		within channel. One large dead individual dead on river bank.	1-5
RA-124	399230	4073313	South of Mazourka		1-5
RA-119	399385	4073310		within wetted extent w/dead individual in river	
RA-124	399223	4072978	South of Mazourka	on bank, 2m high, 1 plant	1-5
RA-119	399272	4072867		resprout on bank	1-5
RA-119	399282	4072856		within floodplain	1-5
RA-124	399182	4072803	South of Mazourka	2 plants in depression. 70m from river	1-5
RA-119	399233	4072714			1-5
RA-119	399618	4072284		seedlings w/large mature trees. 100m x10m area	6-25
RA-119	399681	4071918		3 plants	1-5
RA-119	400006	4071894		within slash in ditch	1-5
RA-124	399581	4071674	South of Mazourka	4 large ones	1-5
RA-119	400122	4071506		outcropping within ditch with TARA slash	1-5
RA-124	399497	4070796	South of Mazourka	clump of large trees between bluff and river	6-25
RA-136	400085	4069747	south of mazourka rd	2m tall ELAN	1-5
RA-137	400135	4069358	23.0	ELAN on bank	1-5
RA-136	399903	4069346	south of mazourka rd	3 ELAN in flood plain	1-5
RA-136	399976	4069306	south of mazourka rd	5 ELAN in vicinity, 4 inside channel water	1-5
RA-136	399923	4069187	south of mazourka rd	1 here, 3 20m W	1-5
RA-136	399756	4068999	south of mazourka rd	5 plants. 1 6m tall	1-5
RA-137	399971	4068957	23.0	1 ELAN in oxbow	1-5
RA-137	399908	4068661	23.0	2 large ELAN on bank and floodplain	1-5
RA-136	399808	4068617	south of mazourka rd	edge of bank	
RA-136	399828	4068338	south of mazourka rd	resprout from 1/1/98 fire	1-5
RA-130	400460	4067999	south of mazourka canyon rd.	ELAN <.5m, on grassy bank	1-5
RA-130	400843	4067524	south of mazourka canyon rd.	edge of water w/scirpus.	1-5
RA-135	400572	4067405	above and below manzanar reward rd.	8 trees but 5 are without leaves. Very wet marshy area with Carex, Juncus, Epilobium, Mentha, etc.	6-25
RA-130	400673	4067361	south of mazourka canyon rd.	at water edge on grassy bank	1-5
RA-135	400656	4067150	above and below manzanar reward rd.	dead russian olive towards river	1-5
RA-135	400629	4067117	above and below manzanar reward rd.	dead ELAN in water standing	1-5
RA-135	400623	4067049	above and below manzanar reward rd.	dead ELAN in water standing	1-5
RA-135	400588	4066939	above and below manzanar reward rd.	new growth along the drain coming from W	1-5
RA-135	400639	4066896	above and below manzanar reward rd.	2 large trees and 2 small trees along the margin of water. 1 dead.	1-5
RA-135	400659	4066610	above and below manzanar reward rd.	approx. 3m height in standing water among tree willows	1-5
RA-146	401769	4065431	below manzanar reward, east side	1 ELAN within R167, pulled	1-5
RA-146	401800	4065120	below manzanar reward, east side	large ELAN on bank	1-5
RA-146	401770	4065106	below manzanar reward, east side	large ELAN on bank	1-5
RA-133	402439	4059850	South Manzanar to Islands		1-5
RA-144	403855	4056759	Islands	1 large tree on E bank of river ~150m due W from GPS point	1-5
RA-140	404318	4054483	South of islands to lone pine depot rd	3 ELAN's 10m from river.	1-5
RA-140	404319	4054482	South of islands to lone pine depot rd	3 ELAN's 10m from river.	1-5

RAS Table 1, continued 2009 LORP Rapid Assessment Raw Data by Impact Type

Tamarisk Seedlings					
RAS Data ID	**Easting**	**Northing**	**General Survey Area**	**Observer Comments**	**Abundance**
RA-116	394476	4087898	Intake	seedlings - pulled out	1-5
RA-116	394518	4087718	Intake	5 seedlings - pulled out	1-5
RA-126	395012	4087303	south from Blackrock Measuring Station	All submerged at edge of river, still alive; at sandy point bar.	6-25
RA-126	395119	4087147	south from Blackrock Measuring Station	2 TARA seedlings off point bar but now in 6" deep water	1-5
RA-118	395323	4086724		7 seedlings in marsh, 5m from river	6-25
RA-118	395306	4086715		4 seedlings, 2-3m from channel	1-5
RA-126	395228	4086341	south from Blackrock Measuring Station	7 seedlings in 4-6" of water	6-25
RA-126	395266	4086280	south from Blackrock Measuring Station	All in water approx. 8" deep; some possibly >1 yr old.	26-100
RA-131	395506	4085929	East of Wagonner	1 TARA seedling on muddy sandy point bar - pulled	1-5
RA-125	395955	4084686	mile 5.1	12 seedling TARA in water, one plant has gone to seed	6-25
RA-121	393710	4084482	Waggoner	pulled 11 seedlings	6-25
RA-121	393714	4084464	Waggoner	pulled 8 seedlings	6-25
RA-121	393671	4084448	Waggoner	3 seedlings, pulled	1-5
RA-121	393786	4084398	Waggoner	pulled 3	1-5
RA-112	392300	4083346	Eastside of Winterton Slough	small single stemmed TARA throughout flooded basin	26-100
RA-104	397890	4077504	Two Culverts to Mazourka	less than 1m height, spread for 20m along waters edge.	26-100
RA-104	397920	4077342	Two Culverts to Mazourka	Approx. 6 seedlings near GPS point	1-5
RA-132	398366	4075596	South of two culverts	TARA seedlings and juvenile in middle of river	1-5
RA-132	398391	4075517	South of two culverts	TARA seedlings in river channel	1-5
RA-132	398550	4075466	South of two culverts	1 TARA seedling on bank	1-5
RA-135	401073	4065939	above and below manzanar reward rd.	2 seedlings, <30cm, among SALA3 juveniles. High flood plain dry grass area.	1-5
RA-146	401800	4065120	below manzanar reward, east side	TARA seedlings in river near bank.	1-5
RA-128	402049	4064472	south of Manzanar Reward Road	1 1m tall TARA	1-5
RA-128	402019	4064319	south of Manzanar Reward Road	6-2m tall TARA (not resprout)	6-25
RA-128	402079	4063899	south of Manzanar Reward Road	2 4" high TARA's, not resprouts	1-5
RA-138	402806	4060896	south of Manzanar Reward Road	2 TARA seedlings, still there, too hard to pull	1-5
RA-138	402675	4060668	south of Manzanar Reward Road	2 1m tall TARA, pulled	1-5
RA-138	402644	4060316	south of Manzanar Reward Road	more than 25 TARA seedlings, could not pull all. And more than 5 large trees in water	26-100
RA-143	403171	4057489	Islands, west side	around 1m tall	6-25
RA-139	403899	4057459	Islands	100+ TARA seedlings. Also mature TARA	>100
RA-144	403965	4057432	Islands	15 seedlings on muddy wet surface near very slowly moving(?) old channel.	6-25
RA-144	404030	4057243	Islands	approx. 10 seedlings on dry mud/open among yearlings	6-25
RA-144	403644	4056477	Islands	3 seedlings. Pulled	1-5
RA-143	403346	4056285	Islands, west side	In depression with dying cattails.	>100
RA-143	403398	4056225	Islands, west side	In bare depression adjacent to cattails	6-25
RA-147	409137	4048128	Lone Pine	1 TARA seedling, pulled	1-5
RA-149	411953	4045336	Below Hwy 136 to pumpback	TARA seedlings on flood plain at base of pumpback rd.	26-100

RAS Table 1, continued 2009 LORP Rapid Assessment Raw Data by Impact Type

Slash				
RAS Data ID	**Easting**	**Northing**	**General Survey Area**	**Observer Comments**
RA-115	392575	4092310	Intake to 2.2	linear pile, 3-5m wide, 50m long 1m tall. See map
RA-115	392897	4092102	Intake to 2.2	Small round pile along river edge
RA-114	393740	4090547	North of Black Rock ditch	2.33 miles, TARA slash pile, within 5m of river channel
RA-114	393972	4090118	North of Black Rock ditch	2.74 miles, TARA slash pile within 5m from river channel
RA-116	393938	4089902	Intake	Slash pile on river bank, 50m downstream and 30m down
RA-114	393988	4089829	North of Black Rock ditch	2.95 miles, TARA slash within 2m of river. See map for polygon.
RA-116	393874	4089643	Intake	multiple piles in area
RA-116	393851	4089585	Intake	
RA-116	393780	4089553	Intake	Slash on terrace
RA-116	393885	4089417	Intake	3 additional small piles, 10m downstream
RA-116	393914	4089264	Intake	adjacent to LELA
RA-116	393961	4089188	Intake	5 piles approx. 10-20m apart, continues until point 024
RA-116	393966	4089146	Intake	5 piles approx. 10-20m apart, starts at point 023
RA-116	394010	4089073	Intake	
RA-116	393997	4089017	Intake	4 piles, 10m apart
RA-116	393967	4088942	Intake	on the elevated bank, continuous 5 downstream.
RA-116	394161	4088900	Intake	2 more downstream
RA-116	394190	4088751	Intake	2 big piles near recruitment
RA-116	394258	4088646	Intake	
RA-116	394250	4088545	Intake	
RA-116	394300	4088513	Intake	2 piles
RA-116	394304	4088430	Intake	2 slash piles, 20m apart
RA-116	394255	4088321	Intake	
RA-116	394389	4088133	Intake	
RA-116	394411	4088106	Intake	
RA-126	394560	4087783	south from Blackrock Measuring	3 piles approx.10mx15m on bank.
RA-126	394623	4087699	south from Blackrock Measuring	A few small piles 3mx3m on bank.
RA-118	394826	4087471		Pile approx. 2-4m from river on east side
RA-126	395083	4087158	south from Blackrock Measuring	At least 3 linear piles along bank at terrace edge; 10mx2m
RA-126	395230	4087008	south from Blackrock Measuring	5 piles on point bar; 2mx5m
RA-126	395090	4086976	south from Blackrock Measuring	Tiny slash pile 4mx4m on terrace
RA-126	395158	4086186	south from Blackrock Measuring	2 small piles approx. 5mx5m on upland area
RA-126	395214	4085962	south from Blackrock Measuring	small pile on terrace next to road approx. 5mx5m
RA-126	395301	4085910	south from Blackrock Measuring	small slash pile on terrace, approx. 5mx5m
RA-118	395684	4085711		30m long approx. 5-10m from river channel
RA-131	395873	4085288	East of Wagonner	5mx10m slash pile on terrace
RA-131	395885	4085135	East of Wagonner	2mx5m pile on terrace in uplands
RA-125	395955	4084686	mile 5.1	small to medium pile on edge of water
RA-125	395894	4084313	mile 5.1	medium pile on edge of channel
RA-117	395792	4084065		N edge of TARA slash polygon on map. S edge is point 011. TARA slash burned on bank.
RA-117	395736	4083658		S edge of TARA slash polygon on map. N edge is point 007. TARA slash burned on bank.
RA-117	395629	4083561		N end of slash on bank.
RA-117	395723	4083140		Big slash piles W side just N of Goose Lake measure station
RA-117	395805	4082928		Slash polygon on map, S end
RA-122	396775	4080948	Goose return to two culverts.	Slash piles along riparian fence. Polygon on map.
RA-122	397518	4080683	Goose return to two culverts.	Able to reach river along road. Photos 93,94 a lot of slash along E bank of river. Photos 95,96 BAHY continues to the S 10' tall in some places
RA-122	397671	4080379	Goose return to two culverts.	slash on E river bank
RA-122	397974	4078897	Goose return to two culverts.	TARA, willow, cottonwood slash. Start of polygon on map, ending point is 015
RA-122	397979	4078798	Goose return to two culverts.	TARA slash continued
RA-122	397939	4078634	Goose return to two culverts.	slash on E bank continued
RA-122	397871	4078432	Goose return to two culverts.	slash on both sides. End of polygon beginning at point 011
RA-127	397741	4078055	2 culverts to mazourka canyon	Several small 10-15' diameter slash piles on peninsula bounded by 2 Culverts Rd., river side channel and river. Approx. 25 count
RA-127	397680	4078018	2 culverts to mazourka canyon	Approx. 10 small slash piles along N side of side channel rounding corner and continuing S. Approx. 10-15' in diameter.
RA-134	397980	4077971	North of two culverts	small pile on bank, some falling into channel
RA-127	397813	4077946	2 culverts to mazourka canyon	Large slash pile approx. 30' in diameter and 2' deep.
RA-127	397704	4077847	2 culverts to mazourka canyon	Approx. 10 small 16' in diameter slash piles along S side of side channel and N of river
RA-132	398365	4075690	South of two culverts	small pile of slash on river bank
RA-132	398516	4075475	South of two culverts	TARA slash on sandy point bar
RA-132	398763	4075213	South of two culverts	few small slash piles along river
RA-124	398737	4074558	South of Mazourka	Drew on map, big area of slash
RA-124	398984	4074204	South of Mazourka	on river bank among willows
RA-124	399004	4074099	South of Mazourka	along bank
RA-124	398856	4073905	South of Mazourka	4 huge piles 75m from river
RA-119	399409	4073389		slash piles on flood plain
RA-119	399355	4072753		TARA slash piles (2-3)

RAS Table 1, continued 2009 LORP Rapid Assessment Raw Data by Impact Type

Slash OB				
RAS Data ID	**Easting**	**Northing**	**General Survey Area**	**Observer Comments**
RA-113	392589	4092239	Intake South	3 slash piles, no resprout, 15m x 10m each on floodplain in old oxbow
RA-113	392650	4092200	Intake South	15m X 10 m each on floodplain, no resprouts, 3 slash piles
RA-113	392794	4092179	Intake South	10m X 10m slash, no resprout
RA-113	392873	4092062	Intake South	10m X 3m
RA-113	392883	4091975	Intake South	10m X 5m, 2 small piles
RA-115	392960	4091927	Intake to 2.2	Small round pile along river edge
RA-116	393717	4090312	Intake	TARA slash in flooded oxbow
RA-116	393897	4089704	Intake	(in wetted extent), 2 more piles, 20m downstream
RA-114	393900	4089556	North of Black Rock ditch	TARA slash in river channel, 3 piles
RA-116	393846	4089454	Intake	On edge, partial wetting
RA-116	393960	4089262	Intake	
RA-114	394265	4088585	North of Black Rock ditch	Large slash piles (3) within river and flood plain
RA-114	394270	4088384	North of Black Rock ditch	large TARA slash at river mile 4.29

Trash				
RAS Data ID	**Easting**	**Northing**	**General Survey Area**	**Observer Comments**
RA-114	393998	4090061	North of Black Rock ditch	2.78 miles, Barbed wire along river channel.
RA-156	394853	4082781	Coyote, Goose Lake to River, West Side	t-post/bucket with cans bottles and misc trash at edge of Goose Lake
RA-122	397867	4078104	Goose return to two culverts.	trash along road at Two Culverts
RA-144	404111	4057560	Islands	2 plastic bags - not very old
RA-140	406818	4054065	South of islands to lone pine depot rd	couch at edge of river
RA-108	411866	4045673	Highway 138 South	Barbed wire by the river
RA-149	411964	4045380	Below Hwy 136 to pumpback	oil sorbent berms on flood plain

RAS Table 1, continued   2009 LORP Rapid Assessment Raw Data by Impact Type

Wildlife				
RAS Data ID	**Easting**	**Northing**	**General Survey Area**	**Observer Comments**
RA-116	393642	4090697	Intake	1 female and 1 male Mallard duck.
RA-116	394059	4088925	Intake	carps
RA-116	394094	4088917	Intake	Owens Valley vole waste on river bank
RA-126	394579	4087699	south from Blackrock Measuring	Owens Valley vole droppings and runways in DISP/Bassia
RA-126	395011	4087254	south from Blackrock Measuring	Owens Valley vole sign in DISP/Bassia
RA-126	395016	4087114	south from Blackrock Measuring	Owens Valley vole runways and droppings in dense DISP
RA-126	395241	4086238	south from Blackrock Measuring Station	Owens Valley vole droppings and runways. Tremendous amount of vole activity in area of BAHY/DISP
RA-131	395453	4086074	East of Wagonner	Owens Valley vole sign; runway with droppings leading to water edge through open BAHY, JUNCUS
RA-131	395443	4085894	East of Wagonner	Virginia rail climbed on pile of BAHY and LELA and preened
RA-131	395509	4085807	East of Wagonner	Owens Valley vole - very fresh droppings along runway through DISP. clipping LETR, DISP
RA-156	393691	4085628	Coyote, Goose Lake to River, West	horned owl
RA-131	396047	4085032	East of Wagonner	Owens Valley vole runways and dropings in DISP and clippings
RA-125	395955	4084686	mile 5.1	Virginia Rail flushed at mile 5.25. SAGO, SALA <2m, tules, bassia
RA-125	395894	4084313	mile 5.1	juvenile desert horned lizard on sand bar. Approx. 2.5" long
RA-156	394433	4083723	Coyote, Goose Lake to River, West	3 juvenile northern harriers in SAGO
RA-156	394482	4083491	Coyote, Goose Lake to River, West	1 american bittern
RA-112	392024	4083257	Eastside of Winterton Slough	Approx. 8 glossy ibis flying low over slough
RA-117	395955	4082705		black crowned night heron
RA-117	395804	4082652		LMB (large mouth bass) 5-10 at Goose Measuring station
RA-156	395190	4081883	Coyote, Goose Lake to River, West	1 belted kingfisher over lower Goose Lake
RA-151	391767	4080671	Thibaut Unit, BWMA	shorebird flushed from moist meadow - red necked phallarope
RA-151	392068	4080567	Thibaut Unit, BWMA	large 100+ mixed flock of swallows including: barn, bank, and VGSW and cliff (mostly). Foraging over dried emergent veg.
RA-151	392734	4080075	Thibaut Unit, BWMA	SORA flushed from ditch with open emergent veg. (Typha and Eleocharis) in shallow water
RA-151	392900	4079779	Thibaut Unit, BWMA	herd of elk with 1 bull and 19 females/young
RA-127	398005	4077351	2 culverts to mazourka canyon	Considerable Elk traffic. Trails up to 18" wide and numerous with lots of fresh poop. Using peninsula for water and hiding. No browsing found.
RA-132	398228	4075909	South of two culverts	1 large mouth bass, one carp
RA-119	399343	4072466		GBH (great blue heron) in oxbow
RA-119	399766	4071810		ducks, killdeer, GBH (great blue heron)
RA-119	399834	4071061		1 GBH on perch across TYLA
RA-137	399920	4070418	23.0	multiple ducks on open water
RA-137	400146	4070255	23.0	horned owl
RA-137	400108	4070005	23.0	barn owl
RA-137	400213	4069476	23.0	great horned
RA-137	400066	4069165	23.0	GBH (great blue heron) 2, 1 duck
RA-130	400712	4067004	south of mazourka canyon rd.	great blue heron
RA-130	400862	4066716	south of mazourka canyon rd.	northern harrier circling
RA-135	400658	4066681	above and below manzanar reward	2 owls
RA-146	401144	4065923	below manzanar reward, east side	belted kingfisher
RA-135	401185	4065629	above and below manzanar reward	elk sharpening antler against SALA3
RA-146	401443	4065521	below manzanar reward, east side	1 GBH (great blue heron) on perch over pond
RA-135	401588	4065456	above and below manzanar reward	black raccoon-like animal
RA-146	402761	4063440	below manzanar reward, east side	1 cinnamon teal in oxbow. Stagnant standing water.
RA-138	402457	4062080	south of manzanar reward rd	female wood duck in duck weed pond (flushed) see photo
RA-133	402702	4061127	South Manzanar to Islands	Bull Tule Elk ran through PHAU
RA-133	402629	4060183	South Manzanar to Islands	Owens Valley vole seen entering its runway
RA-138	402641	4060043	south of manzanar reward rd	fresh elk bedding site
RA-133	402559	4059878	South Manzanar to Islands	young coyote
RA-139	403068	4058402	Islands	vole droppings. Path through TYLA
RA-139	403349	4058276	Islands	elk bugling. TYLA pond.
RA-143	403044	4057989	Islands, west side	bull Tule Elk sighting
RA-143	403174	4057564	Islands, west side	approx. 12 elk
RA-144	404241	4057545	Islands	Elk; 6-7 cows and calf
RA-144	403644	4056477	Islands	Owens Valley vole droppings on the bank
RA-143	403340	4056353	Islands, west side	Many runways along bank of channel. Owens Valley vole scat.
RA-140	405029	4054313	South of islands to lone pine depot rd	horned owl (nest)
RA-103	407893	4050410	S. of Narrow Gauge Rd/Depot Rd	2 Mallard hens on river.
RA-103	408388	4049979	S. of Narrow Gauge Rd/Depot Rd	Flushed a great horned owl.
RA-105	408569	4049054	Narrow Gauge Road South	one duck in river
RA-149	410928	4047237	Below Hwy 136 to pumpback	1 lesser nighthawk
RA-149	411070	4046466	Below Hwy 136 to pumpback	northern harrier flying over flood plain
RA-106	411743	4045587	Between 138 and pumpback, The	Great Horned Owl on snag along west bank, juvenile
RA-149	411864	4045503	Below Hwy 136 to pumpback	1 GBH on snag over river
RA-154	412557	4044515	Delta east side	yellowheaded blackbird
RA-153	413474	4042500	Delta	40 white faced Ibis foraging in small pond (picture of 2) American bittern in area.

RAS Table 1, continued 2009 LORP Rapid Assessment Raw Data by Impact Type

Woody Recruitment					
RAS Data ID	**Easting**	**Northing**	**General Survey Area**	**comments**	**Abundance**
RA-113	392454	4092585	Intake South	SAEX, 2 age classes on river bank	6-25
RA-113	392492	4092439	Intake South	SAEX sprouts on bank	1-5
RA-116	393786	4089565	Intake	SALA3 (3 trees)	1-5
RA-116	394190	4088751	Intake	2 Red Willow	1-5
RA-116	394258	4088646	Intake	Gooding, Red, Coyote willow seedlings	1-5
RA-116	394239	4088223	Intake	SALA3 recruitment, 1 plant	1-5
RA-116	394353	4088139	Intake	SALA3 recruitment and juvenile. 11 individual plants on sandbar, some with leaf disease	6-25
RA-126	394552	4087790	south from Blackrock Measuring Station	SAEX on muddy, sandy edge of river.	6-25
RA-116	394518	4087718	Intake	SAEX & SALA3	1-5
RA-126	394930	4087440	south from Blackrock Measuring Station	3 SAEX on bank in dense Bassia/HECU	1-5
RA-126	395012	4087303	south from Blackrock Measuring Station	Prob. SAEX on upstream edge of sandy point bar where slash, burned.	6-25
RA-126	395119	4087147	south from Blackrock Measuring Station	2 red willow seedlings off point bar but in water, approx. 6" deep.	1-5
RA-118	395323	4086724		2 seedlings	1-5
RA-118	395260	4086523		3 seedlings, <2m tall, semi-full	1-5
RA-111	393639	4086456	Eastside of Upper Twin Lake	SAGO <1m, growing out of burned stalk	
RA-126	395228	4086341	south from Blackrock Measuring Station	Red willow seedlings all in standing water. Photo is of general area	1-5
RA-126	395178	4086310	south from Blackrock Measuring Station	Approx. 20 Salix seedlings approx. 3' tall. Probably at edge of wetted extent, now moist and DISP	6-25
RA-126	395277	4086020	south from Blackrock Measuring Station	2 red willow seedlings plus saplings on point bar; photo of area	1-5
RA-131	395506	4085929	East of Wagonner	2 red willow seedlings, muddy sandy point bar. 1 TARA seedling	1-5
RA-131	395716	4085821	East of Wagonner	1 SAGO on muddy, sandy point bar; only approx. 1" tall. 2 sapling red willow in water under stress	1-5
RA-131	395740	4085643	East of Wagonner	approx. 300 SAGO seedlings in sandy moist point bar with DISP&BAHY; photo of area	>100
RA-131	395960	4085092	East of Wagonner	2 probably SAGO seedlings amongst young BAHY on sandy point bar	1-5
RA-118	395990	4085045		12-17 SAGO seedlings, 20m apart, <3m from river	6-25
RA-121	393671	4084448	Waggoner	SALA3, 1 seedling	1-5
RA-117	395811	4084316		Salix sp. In water. Seedlings and saplings	1-5
RA-117	395805	4084315		Salix sp. Bicolor, no Stip.(1 plant)	1-5
RA-117	395841	4084175		Salix - serrated edges, stips. Seedlings and saplings	6-25
RA-117	395861	4084063		Salix seedlings and saplings	1-5
RA-117	395942	4084020		Salix seedlings and saplings, 1-3m tall	6-25
RA-117	395862	4083003		Salix sp. 100m S side point bar, seedlings and saplings	26-100
RA-117	395866	4082874		Salix sp. point bar, approx 75m, seedlings and saplings	26-100
RA-117	395955	4082705		Mature (2" diameter) present as well as seedlings	6-25
RA-117	396144	4082498		seedlings up to 2m tall	26-100
RA-117	396307	4082249		point bar, seedlings up to 2m tall, one juvenile decadent/dead	26-100
RA-104	397890	4077504	Two Culverts to Mazourka	less than 1m height, spread for 20m along waters edge. 15 SAGO seedlings, 6 older	6-25
RA-104	397920	4077342	Two Culverts to Mazourka	recruitment along bank for 40m, SAGO 1m tall	>100
RA-104	397879	4077103	Two Culverts to Mazourka	recruitment along 30m stretch of bank and away from bank. 25 plants greater than 1 year old, mostly SAGO, some SALA	>100
RA-104	398060	4076656	Two Culverts to Mazourka	Approx. 6 plants less than 1m tall. All appear to be new recruitment.	6-25
RA-127	398275	4076143	2 culverts to mazourka canyon	SAEX seedlings/ same area SAEX 1-2 yr olds, 6-25 count. All moderately browsed	1-5
RA-104	398277	4075926	Two Culverts to Mazourka	primarily SAGO, all less than 1m tall, some plants greater than 1 year old.	26-100
RA-123	398985	4075134	In between two culverts and Mazourka	1 cottonwood seedling on river bank along with approx. 3 willow seedlings	1-5
RA-119	399401	4073356		SAEX recruitment within wetted extent	>100
RA-119	399310	4072567		SALA3 recruitment in oxbow	26-100
RA-119	399317	4072357		SALA3 recruitment	6-25
RA-119	399681	4071899		SALA3 recruitment on river bank	6-25
RA-119	399461	4071866		SALA3 recruitment	1-5
RA-130	400672	4067358	south of mazourka canyon rd.	5 seedling SAEX at water edge	1-5
RA-130	400665	4067050	south of mazourka canyon rd.	SAEX seedlings, approx. 5 at edge of water	1-5
RA-130	400720	4067004	south of mazourka canyon rd.	many SAEX seedlings	6-25
RA-130	400734	4066964	south of mazourka canyon rd.	approx. 100 SAEX seedlings along bank adjacent to pond	>100
RA-135	400597	4066938	above and below manzanar reward rd.	SAEX along the drain coming from W. among shrubby SAEX. >20m from river	6-25

RAS Table 1, continued 2009 LORP Rapid Assessment Raw Data by Impact Type

Woody Recruitment (continued)					
RAS Data ID	Easting	Northing	General Survey Area	comments	Abundance
RA-135	400674	4066858	above and below manzanar reward rd.	SAEX along the margin among SAEX shrubs	1-5
RA-130	400896	4066661	south of mazourka canyon rd.	seedlings SAEX around margin of pond	26-100
RA-130	400844	4066292	south of mazourka canyon rd.	adjacent to water. SAEX	6-25
RA-135	400996	4066261	above and below manzanar reward rd.	SALA3 1 small <50cm tall among >1m taller juveniles (>1-yr old). Margin of wetted extent	1-5
RA-135	401070	4065931	above and below manzanar reward rd.	3 SALA3 seedlings, approx. 50 cm. Among juveniles, high flood plain dry grass area	1-5
RA-128	402055	4064671	south of Manzanar Reward Road	willow seedlings	1-5
RA-128	402074	4064543	south of Manzanar Reward Road	2 willow seedlings among larger ones	1-5
RA-138	402806	4060896	south of manzanar reward rd	more than 25 willow seedlings	26-100
RA-138	402818	4060881	south of manzanar reward rd	more than 5 SAGO seedlings	6-25
RA-133	402649	4060700	South Manzanar to Islands	SAGO on shallow bank, mixed with some 1+ yr olds	6-25
RA-138	402675	4060642	south of manzanar reward rd	2 SAGO seedlings	1-5
RA-144	403388	4056099	Islands	SAGO seedlings (some are larger - some are smaller <50cm) on the island among JUBA/DISP	6-25
RA-140	403919	4055057	South of islands to lone pine depot rd	1 seedling Salix. 2m from water	1-5
RA-145	407003	4053912	north of narrow gauge rd.	new year's willows mixed with 1-2 yr olds. (approx. 100 1-2yr olds). Growing on perfect little sandy point bar under train bridge	6-25
RA-140	407122	4053705	South of islands to lone pine depot rd	5 seedlings, Salix (red)	1-5
RA-140	407132	4053672	South of islands to lone pine depot rd	5 seedlings under several saplings. Red willows	1-5
RA-105	409142	4048144	Narrow Gauge Road South	SAGO seedlings on river bank south of measuring station.	6-25
RA-154	412356	4044890	Delta east side	SAEX seedlings <30cm among dead tules	1-5
RA-152	412868	4042974	Delta	seedlings to mature plants between GPS points 70 and 71. Lots of recruitment of shrub willow.	26-100
RA-152	412917	4042771	Delta	seedlings to mature plants between GPS points 70 and 71. Lots of recruitment of shrub willow.	26-100

Other					
RAS Data ID	Easting	Northing	General Survey Area	Observer Comments	Abundance
RA-113	393200	4091489	Intake South	Debris block, water backing up	
RA-126	395182	4086158	south from Blackrock Measuring	5 photos of conditions in this area - decadent Bassia.	
RA-117	395677	4083248	River Mile 10.2	Enclosure located on W side from NW 1/4. 10.2-10.4 miles. BAHY observed extensively in enclosure.	
RA-117	395784	4083111	River Mile 10.5	25m long cut bank	
RA-117	396512	4082051	River Mile 11.6	cut bank 15m, deep hole	
RA-155	391350	4080713	Thibaut - rare plant exclosure - West	SPGR located on corner of fence, population spreads to SW	>100
RA-122	397784	4079760	Goose return to two culverts.	Soild cattails and tules in river channel. Would not be able to float past this spot	
RA-132	398365	4075690	South of two culverts	aquatic vegetation in river, roughly 6 large mouth bass and 8 carp	
RA-140	404309	4054500	South of islands to lone pine depot rd	1 bush half inch green obtuse leaves blue berries. Edge of water	1-5
RA-142	405002	4054200	South of islands	30m to W of point ran into swarm of bees. There was a cottonwood on the riverbank in the mud. Did not get a GPS point due to bees.	

RAS Table 1, Continued 2009 LORP Rapid Assessment Raw Data by Impact Type

Revisit- River Sites						
RAS Data ID	Easting	Northing	Observation Code	General Survey Area	Observer Comments	Abundance
RA-113	393395	4091223	Road	Intake South	Revisit #R1, rehab road, no use, revegetated	
RA-113	393574	4091165	Road	Intake South	Revisit #R2, rehab road, used in last year, not recently	
RA-116	393581	4090873	Road	Intake	No evidence of road use in flood plain. Vehicle use up to edge of floodplain, no barrier.	
RA-116	393612	4090816	Road	Intake	Same condition as last year. Flooded road, no use to S.	
RA-142	403323	4056083	Road	South of islands	Revisit #R6; road in floodplain. Looks like it is still being used. There are ruts from it being wet and people driving on it. Exclosure looked like it was working.	
RA-143	403001	4057971	Tara_Seed	Islands, west side	did not see any TARA seedlings on revisit	
RA-143	403114	4057371	Tara_Seed	Islands, west side	Revisit #R8; hundreds of seedlings in depression next to cattails, pulled larger ones. Seedlings continue S on trail along channel	>100
RA-143	403142	4057467	Tara_Seed	Islands, west side	Revisit #R9; approx 1m tall from seed growing in DISP	6-25
RA-143	403127	4057479	Tara_Seed	Islands, west side	no TARA	
RA-143	403284	4056624	Tara_Seed	Islands, west side	Revisit #R11; Still TARA seedlings	6-25
RA-139	403556	4056708	Tara_Seed	Islands	Revisit #R12; 5 new TARA seedlings. Many mature plants, some a couple of years old	1-5
RA-139	403669	4057373	Tara_Seed	Islands	Revisit #R14; approx. 75 1 yr TARA's. no new seedlings. Dry. Mature TARA.Elk bugling	
RA-126	395190	4086315	WDY	south from Blackrock Measuring Station	POFR still present, approx. 6' tall and branching; All other tree willows still present	6-25
RA-137	399971	4068777	WDY	23.0	wdy; SAEX up to 10m up bank. Area looks great	26-100
RA-137	400053	4068496	WDY	23.0	SAEX from bank to 6+m on to floodplain	26-100
RA-137	400077	4070191	WDY	23.0	SALA3 recruitment, all 1-1.5m tall	6-25
RA-137	400097	4070070	WDY	23.0	SALA3 growing among TARA and TARA slash. 1-2m tall	1-5
RA-130	400391	4068264	WDY	south of mazourka canyon rd.	Revisit #R21, wdy; Approx. 15 new SAEX seedlings. Approx. 8 1-yr SAEX on bank w/DISP, ANCA, some ATTO.	6-25
RA-130	400460	4068000	WDY	south of mazourka canyon rd.	Revisit #R22, wdy; SAEX on grassy bank. Approx. 10 new SAEX seedlings, approx. 10 1-yr SAEX	6-25
RA-130	400625	4067539	WDY	south of mazourka canyon rd.	Revisit #R23 wdy; 5 seedlings SAEX. 10 1-yr SAEX in TYLA. Scirpus behind at water edge	1-5
RA-130	400636	4067866	WDY	south of mazourka canyon rd.	Revisit #R24 wdy; <5 1-yr SAEX. 15 2+yr SAEX. No new SAEX seedlings. Thick scripus at toe of slope, slope dry.	
RA-130	400766	4067479	WDY	south of mazourka canyon rd.	Revisit #R25 wdy; sapling POFR. Approx. 2m in standing water with scirpus	1-5
RA-130	400832	4067502	WDY	south of mazourka canyon rd.	Revisit #R26 wdy; 15 SAEX seedlings. Approx. 35 1-yr SAEX on edge of oxbow pond on steep bank. TYLA, some scripus	6-25
RA-130	400853	4067546	WDY	south of mazourka canyon rd.	Revisit #R27 wdy; sapling POFR approx. 9' tall (3m). In phragmites stand, scirpus beyond	1-5
RA-143	403003	4057263	WDY	Islands, west side	no sign of SAGO	
RA-139	403287	4056624	WDY	Islands	Revisit #R29; no evidence of SAGO seedlings. Dry. TARA seedlings	
RA-114	394315	4088533	NOX	North of Black Rock ditch	untreated LELA infestation along river bank	>100
RA-136	400035	4069519	Road	south of mazourka rd	road reclaimed/revegetated. No longer an issue	
RA-144	403644	4056477	Tara_Seed	Islands	Revisit #R36; seedlings still present along muddy part of river margin (yearlings). Pulled	6-25
RA-144	403699	4056418	Tara_Seed	Islands	Revisit #R37; unable to locate any seedlings. Mostly LETR/DISP/HECU. Some open ground, but no sign of TARA	
RA-144	404030	4057243	Tara_Seed	Islands	Revisit #R40; lots of yearlings (seedlings from last year) among young trees	
RA-144	404062	4057107	Tara_Seed	Islands	Revisit #R41; approx. 8 seedlings are observed in one spot	6-25
RA-144	403588	4056352	WDY	Islands	Revisit #R42; no seedlings/yearlings are observed. Lots of HECU/DISP/Juncus	
RA-144	403702	4056497	WDY	Islands	unable to locate any seedlings. Mostly cattail, HECU, uneweed? - almost nightshade like.	
RA-144	403699	4056418	WDY	Islands	Revisit #R44; unable to locate any seedlings. Mostly LETR/DISP/HECU. Some open ground, but no sign of TARA	
RA-144	403691	4056575	WDY	Islands	unable to locate any seedlings. All seedling-like plants are HECU	
RA-144	403965	4057432	WDY	Islands	Revisit #R46; no woody recruitment observed from last year.	
RA-144	403994	4056953	WDY	Islands	Revisit # R47; no seedlings observed	
RA-133	402201	4062687	Trash	South Manzanar to Islands	Revisit #R48; trash on road where ends at bluff. Much use for fishing	
RA-128	402000	4064218	Road	south of Manzanar Reward Road	road; fresh tracks in road, but gate is closed. Evidence of cattle use	
RA-128	401728	4065077	WDY	south of Manzanar Reward Road	wdy; 50+ willow seedlings and larger	26-100
RA-128	401902	4065046	WDY	south of Manzanar Reward Road	wdy; <25 willow seedlings and some larger	6-25
RA-128	401998	4064800	WDY	south of Manzanar Reward Road	wdy; no willow recruitment at all.	

RAS Table 1, Continued 2009 LORP Rapid Assessment Raw Data by Impact Type

Revisit- River Sites (continued)						
RAS Data ID	Easting	Northing	Observation Code	General Survey Area	Observer Comments	Abundance
RA-128	402015	4064708	WDY	south of Manzanar Reward Road	wdy; no POFR (flooded area)	
RA-128	402028	4064672	WDY	south of Manzanar Reward Road	wdy; approx. 5 willows >1m tall	1-5
RA-128	402031	4064589	WDY	south of Manzanar Reward Road	7 willow seedlings and 1 larger	6-25
RA-128	402045	4064337	WDY	south of Manzanar Reward Road	no willow seedlings, flooded area	
RA-128	402105	4064146	WDY	south of Manzanar Reward Road	1 1m tall willow	1-5
RA-128	402125	4064128	WDY	south of Manzanar Reward Road	wdy; 25+ willow seedlings	26-100
RA-128	402160	4063990	WDY	south of Manzanar Reward Road	wdy; 25+ willow seedillngs	26-100
RA-128	402205	4063762	WDY	south of Manzanar Reward Road	same as before; willow and POFR seedlings	>100
RA-128	402214	4063790	WDY	south of Manzanar Reward Road	25+ willow seedling, no POFR	26-100
RA-128	402257	4062777	WDY	south of Manzanar Reward Road	wdy; same as before	26-100
RA-128	402350	4063682	WDY	south of Manzanar Reward Road	same as before	26-100
RA-128	402490	4063493	WDY	south of Manzanar Reward Road	wdy; same as before	26-100
RA-128	402525	4063459	WDY	south of Manzanar Reward Road	wdy; same as before	26-100
RA-128	402651	4063327	WDY	south of Manzanar Reward Road	wdy; same as before	26-100
RA-122	397830	4079850	EXW	Goose return to two culverts.	BAHY too thick to make it to 67	
RA-113	392865	4092086	Road	Intake South	Road has been disced, is revegetating, should check on in 2010	
RA-113	393144	4091945	Road	Intake South	Revisit #R70, Rehab road, revegetating, driven over once	
RA-140	404368	4054788	Road	South of islands to lone pine depot rd	non-issue overgrown	
RA-122	396568	4081439	WDY	Goose return to two culverts.	Could not get close to revisit sites due to vegetation. I could still see the woody recruitment. There was both willows and cottonwoods. Looked like they were doing well.	
RA-122	396574	4081385	WDY	Goose return to two culverts.	Could not get close to revisit sites due to vegetation. I could still see the woody recruitment. There was both willows and cottonwoods. Looked like they were doing well.	
RA-122	396665	4081429	WDY	Goose return to two culverts.	Could not get close to revisit sites due to vegetation. I could still see the woody recruitment. There was both willows and cottonwoods. Looked like they were doing well.	
RA-122	397489	4080734	WDY	Goose return to two culverts.	only one cottonwood and the willows are dead	
RA-122	397901	4080227	WDY	Goose return to two culverts.	was not able to make it to 78 due to thick BAHY	
RA-143	402594	4058958	WDY	Islands, west side	SAEX reprouts still alive in meadow	6-25
RA-136	399510	4070575	EXW	south of mazourka rd	no thistle found	
RA-136	399619	4070569	EXW	south of mazourka rd	Revisit #R84; CIVU still here	
RA-136	399988	4070129	WDY	south of mazourka rd	Revisit #R85; 1 Salix found, mild browse, .5m tall	
RA-124	399172	4072787	Tara_Seed	South of Mazourka	Revisit #R86, 50+ TARA Seedlings and over 1yr old. Yearling willow.	26-100
RA-124	399238	4072539	Tara_Seed	South of Mazourka	Revisit #R87, mature TARA from weeds, willows still persisting	26-100
RA-124	399236	4072556	WDY	South of Mazourka	Revisit #R93, 1 resprout/1 seedling	1-5
RA-124	399274	4072306	WDY	South of Mazourka	SAGOs still here	1-5
RA-124	399273	4072341	WDY	South of Mazourka	Revisit #R100, 7 1m SAGOs and one 1m TARA	1-5
RA-124	399278	4072263	WDY	South of Mazourka	1 willow still there (very inundated)	
RA-124	399355	4073258	WDY	South of Mazourka	still a lot of TARA, pulled it. Willow seedlings	26-100
RA-124	399362	4073234	WDY	South of Mazourka	POFR, willows and TARA (pulled) still here	
RA-124	399492	4071752	WDY	South of Mazourka	Revisit #R105, still here SAGO and TARA seedlings	
RA-124	399498	4071732	WDY	South of Mazourka	Revisit #R106, 100+ TARA seedlings and 50+ SAGO seedlings.	6-25
RA-124	399698	4071648	WDY	South of Mazourka	50+ 1 yr SAGOs growing in spike brush	
RA-136	400006	4070349	WDY	south of mazourka rd	Revisit #R108; not treated	
RA-114	394325	4088510	NOX	North of Black Rock ditch	untreated LELA infestation along river bank	>100
RA-114	394260	4088247	WDY	North of Black Rock ditch	Revisit #R112, SALA3 1-3m tall plants at 4.38 river miles. TARA slash still present, TARA seedlings	26-100
RA-114	394459	4087840	WDY	North of Black Rock ditch	SALA3 1-3m tall plant at 4.80 river miles (&SAGO)	26-100

RAS Table 1, Continued 2009 LORP Rapid Assessment Raw Data by Impact Type

Revisit- River Sites (continued)						
RAS Data ID	Easting	Northing	Observation Code	General Survey Area	Observer Comments	Abundance
RA-138	402806	4060881	WDY	south of manzanar reward rd	More than 5 in tall willows	6-25
RA-105	409110	4048152	Rec	Narrow Gauge Road South	Revisit #R118. Toilet paper on concrete of measuring station. Fire ring gone.	
RA-103	407399	4051585	Road	S. of Narrow Gauge Rd/Depot Rd	4x4 fun hill. Hasn't been used recently but still very visible. Some DISP filling in bare spots.	
RA-103	407443	4052262	Trash	S. of Narrow Gauge Rd/Depot Rd	Old couch. Still here - disintegrating	
RA-103	407765	4051198	WDY	S. of Narrow Gauge Rd/Depot Rd	S. laevigata recruits (4). 3-4m tall along bank.	
RA-116	394272	4088172	WDY	Intake	recruitment still present, one mortality	
RA-126	395114	4087141	WDY	south from Blackrock Measuring Station	Cottonwood sapling still present approx. 6" deep in water. Approx. 10 SAEX saplings also.	1-5
RA-140	407488	4052970	FEN	South of islands to lone pine depot rd	overgrown	
RA-140	406999	4053927	Rec	South of islands to lone pine depot rd	overgrown	
RA-125	395895	4084646	Tara_Seed	mile 5.1	Revisit #R126, 7 seedling TARA in water and/at waters edge; most plants vegetative, but 1 flowering	1-5
RA-117	395753	4084266	Tara_Seed		TARA present, 1 plt	1-5
RA-140	405388	4054358	Trash	South of islands to lone pine depot rd	still here overgrown	
RA-125	394983	4087339	WDY	mile 5.1	2 POFR, 3 SAGO, all <2m	
RA-131	396050	4084850	WDY	East of Wagonner	Revisit #R132; GPS point wrong; POFR still 1.5m, but branching; 2 sapling red willow and approx. 10 sapling SAEX all flooded	
RA-127	397779	4077779	WDY	2 culverts to mazourka canyon	Revisit #R133; Approx. 20-30 willows located; difficult to count still being suppressed by cattails.	6-25
RA-127	397791	4077992	WDY	2 culverts to mazourka canyon	Revisit #R134; willows present approx. 10' tall. Could not count due to encroachment of cattail and depth of water	1-5
RA-127	397871	4077045	WDY	2 culverts to mazourka canyon	Only large willows found. Point is 35' from river. River can barely be seen. Did not find "2 small islands"	
RA-127	398035	4077033	WDY	2 culverts to mazourka canyon	Revisit #R137; willows located. Group of willows (9) to south of 2 meter. Willow previously noted (2008) moderately browsed.	6-25
RA-127	398113	4076767	WDY	2 culverts to mazourka canyon	Willows located; all about 8-10' tall in cattails. Healthy plants.	6-25
RA-127	398187	4076309	WDY	2 culverts to mazourka canyon	Revisit #R139; 1-3 year old red willows located along old point bar, 1-3' tall, moderately browsed	26-100
RA-124	398996	4073622	WDY	South of Mazourka	7 yearling Gooding willows	6-25
RA-124	399094	4073486	WDY	South of Mazourka	willow recruitment, whitethorn acacia, a russian olive, no cottonwood	26-100
RA-124	399117	4073455	WDY	South of Mazourka	Revisit #R142, willows in water, TARA 1m tall	1-5
RA-133	402357	4061456	WDY	South Manzanar to Islands	willows still persisting	1-5
RA-133	402628	4060273	WDY	South Manzanar to Islands	Revisit #R145; SAEX yearlings persisting	1-5
RA-133	402688	4060574	WDY	South Manzanar to Islands	Revisit #R148; mix of red and gooding willows over 1 yr old, Salix seedling closer to water then 1+yrs old in moist soil.	6-25
RA-133	402782	4060869	WDY	South Manzanar to Islands	4 SAEX approx. 2' tall	1-5
RA-140	406914	4054016	WDY	South of islands to lone pine depot rd	willow okay	
RA-140	406898	4054041	Road	South of islands to lone pine depot rd	small hill climb, not much use	
RA-148	407245	4051300	Trash	Narrow guage rd south	Revisit #R153; approx. 1 acre covered with misc. trash. No appliances, mainly household items and rec. trash. Shot up TV	
RA-146	402707	4063672	NOX	below manzanar reward, east side	LELA in oxbow. Looks treated. 1 plant	1-5
RA-119	400018	4071129	Tara_Seed		Revisit #156, multiple TARA seedlings untreated	6-25
RA-104	398944	4073695	WDY	Two Culverts to Mazourka	SAGO yearlings and seedlings, TARA also, greater than 1 year ELAN also.	
RA-119	399883	4071832	WDY		Revisit #159, SALA3 seedlings, very inundated. No vigorous yearling growth.	>100
RA-130	400844	4066343	EXW	south of mazourka canyon rd.	no CIVU present	
RA-146	401260	4065667	NOX	below manzanar reward, east side	LELA2, 5 untreated plants in oxbow.	1-5
RA-146	401330	4065656	NOX	below manzanar reward, east side	LELA2, 25 untreated plants, some in seed	6-25

RAS Table 1, Continued 2009 LORP Rapid Assessment Raw Data by Impact Type

Revisit- Wetland Sites						
RAS Data ID	**Easting**	**Northing**	**Observation Code**	**General Survey Area**	**Observer Comments**	**Abundance**
RA-111	392808	4085617	NOX	Eastside of Upper Twin Lake	Flooded, inaccessible	
RA-141	391449	4081698	FEN	Thibaut Ponds	elk jump (elk hair/tracks at crossing). Functioning properly.	
RA-153	414663	4039825	ROAD	Delta	Revisit #R16; quad road crossing channel	
RA-154	414933	4039920	ROAD	Delta east side	Revisit #R17; road, some tracks running from E-W on alkaline crust. Recent marks.	
RA-153	412829	4043169	WDY	Delta	Revisit #R20?; yearling SAEX	6-25
RA-154	412620	4044221	ROAD	Delta east side	Revisit #R21; road turnaround with heavy uses and trash (plastic bottle, shotgun shell, etc). Some denuded veg along the bank.	
RA-153	412885	4043080	WDY	Delta	Revisit #R26?; yearling SAEX	6-25
RA-156	394857	4082745	ROAD	Coyote, Goose Lake to River, West Side	road with turn around located center of Goose Lake on E side providing minimal access to lake.	
RA-155	391472	4080907	ROAD	Thibaut - rare plant exclosure - West side	road completely revegetated	
RA-150	394295	4079212	ROAD	Thibaut	OHV tracks are no longer fresh.	
RA-150	393431	4080512	ROAD	Thibaut	Road - still there	
RA-120	394156	4083643	EXW	Wagonner	No thistle found	
RA-112	392024	4083257	WDY	Eastside of Winterton Slough	Revisit #RW57. 2 ELAN? No other woody recruitment nearby	1-5
RA-112	392294	4083365	Tara_Seed	Eastside of Winterton Slough	Revisit #RW58. 3 big TARA plants and many single stemmed small individuals.	6-25
RA-112	392300	4083346	WDY	Eastside of Winterton Slough	Revisit #RW59. + 10 SAGO plants <1m tall	6-25
RA-112	392327	4083363	Tara_Seed	Eastside of Winterton Slough	Revisit #RW60. 10 large TARA plants and many single stemmed seedlings	6-25
RA-112	391963	4083890	EXW	Eastside of Winterton Slough	Revisit #RW61. cluster of CIVU dead from last year? No new leaves visible, in water.	1-5
RA-112	391958	4083934	EXW	Eastside of Winterton Slough	Revisit #RW62. cluster of CIVU dying off. Flowers still purple. 1-2 plants	1-5
RA-112	391999	4084334	EXW	Eastside of Winterton Slough	Revisit #RW63. Single CIVU dying off.	1-5
RA-112	391714	4085017	EXW	Eastside of Winterton Slough	Revisit #RW64. CIVU, single plant	1-5
RA-112	391688	4085059	ROAD	Eastside of Winterton Slough	Revisit #RW65?. Road goes down into floodplain, among carex, tules	
RA-112	391489	4085808	EXW	Eastside of Winterton Slough	Revisit #RW66. CIVU plants, approx. 6 clumps green/part dead.	6-25

RAS Table 2. 2009 Woody Recruitment Revisit Sites Compared to 2008 Observations

Revisit Sites Woody Recruitment Compared to 2008 Observations						
Revisit Site No.	**Easting**	**Northing**	**General Survey Area**	**Year**	**Observer Comments**	**Abundance**
Intake to Blackrock Ditch						
112	394260	4088247	North of Black Rock ditch	2008	Wdy recruit: willow seedlings, 50+ plants some 1m+ w/main stem and branches - some single-stem seedlings. TARA slash between seedlings and river.	50+
				2009	Revisit #R112, SALA3 1-3m tall plants at 4.38 river miles. TARA slash still present, TARA seedlings	26-100
122	394272	4088172	Intake	2008	Willow juveniles +/- 8-10 around 1m tall.	Unknown
				2009	recruitment still present, one mortality	-1
113	394459	4087840	North of Black Rock ditch	2008	Willow spp. Recruitment patch most 10+ over 15-20m of streambank. TARA seedlings present also.	Unknown
				2009	SALA3 1-3m tall plant at 4.80 river miles (&SAGO)	26-100
Blackrock Ditch to Two Culverts						
131	394983	4087339	mile 5.1	2008	2 POFR (1m) on flooded river edge, +1 ~5 m south (1m tall).	1-5
				2009	2 POFR, 3 SAGO, all <2m	1-5
123	395114	4087141	south from Blackrock Measuring Station	2008	Cottonwood seedling, 1.5m tall.	1-5
				2009	Cottonwood sapling still present approx. 6" deep in water. Approx. 10 SAEX saplings also.	1-5
15	395190	4086315	south from Blackrock Measuring Station	2008	1 POFR ~ 5ft tall; 2 Salix goodingii; 7 SALA (prob 2 yrs old) off point bar.	6-25
				2009	POFR still present, approx. 6' tall and branching; All other tree willows still present	6-25
132	396050	4084850	East of Wagonner	2008	1 POFR (1.5 m tall), 3 Salix (1.5 m tall) on sandy bank. Pulled ~10 TARA seedlings.	1-5
				2009	Revisit #R132; GPS point wrong; POFR still 1.5m, but branching; 2 sapling red willow and approx. 10 sapling SAEX all flooded	6-25
74	396568	4081439	Goose return to two culverts.	2008	2 POFR seedlings present. Plants 1-3m tall in shallow side channel w/ TYLA.	1-5
				2009	Could not get close to revisit sites due to vegetation. I could still see the woody recruitment. There was both willows and cottonwoods. Looked like they were doing well.	1-5
76	396665	4081429	Goose return to two culverts.	2008	End of recruitment patch - South=TYLA-SCAC.	Unknown
				2009	Could not get close to revisit sites due to vegetation. I could still see the woody recruitment. There was both willows and cottonwoods. Looked like they were doing well.	Unknown
75	396574	4081385	Goose return to two culverts.	2008	Top of another wdy patch - 10 - 12:1 willow/POFR ratio in channel w/TYLA.	Unknown
				2009	Could not get close to revisit sites due to vegetation. I could still see the woody recruitment. There was both willows and cottonwoods. Looked like they were doing well.	Unknown
77	397489	4080734	Goose return to two culverts.	2008	POFR-willow recruit. 2 POFR 1+m, willow 1m, streambank.	3
				2009	only one cottonwood and the willows are dead	1
78	397901	4080227	Goose return to two culverts.	2008	POFR 2+m tall on water edge.	1
				2009	was not able to make it to 78 due to thick BAHY	Unknown

Table 2, continued. 2009 Woody Recruitment Revisit Sites Compared to 2008 Observations

Revisit Sites Woody Recruitment Compared to 2008 Observations						
Revisit Site No.	**Easting**	**Northing**	**General Survey Area**	**Year**	**Observer Comments**	**Abundance**
Two Culverts to Mazourka Canyon Road						
134	397791	4077992	2 culverts to mazourka canyon	2008	Low spot, slightly flooded, DISP at least 6 salix, 1st yr (5) ~ 1-2 m tall; 3rd yr (1) ~3 m tall.Mdw continues to W with at least 2 moe salix recruits (1st yr). ~ 50 m W, more salix. 3 approx 3 trs, 2.5 m tall. All through oxbow ~ 20 more 1st yr.	5
				2009	Revisit #R134; willows present approx. 10' tall. Could not count due to encroachment of cattail and depth of water	1-5
133	397779	4077779	2 culverts to mazourka canyon	2008	Numerous > 20 salix in flooded side channel and into river, cattails, MUAS.	20+
				2009	Revisit #R133; Approx. 20-30 willows located; difficult to count still being suppressed by cattails.	6-25
135	397871	4077045	2 culverts to mazourka canyon	2008	Numerous salix on 2 small islands (3m x 3m), 1st yr.	Unknown
				2009	Only large willows found. Point is 35' from river. River can barely be seen. Did not find "2 small islands"	Unknown
137	398035	4077033	2 culverts to mazourka canyon	2008	Salix in MUAS, in sat soil ~ 2m tall, 2nd yr, ~ 5 more to S. 1 (2nd yr, 2m); 3 (1st yr, 1m).	Unknown
				2009	Revisit #R137; willows located. Group of willows (9) to south of 2 meter. Willow previously noted (2008) moderately browsed.	6-25
138	398113	4076767	2 culverts to mazourka canyon	2008	~25 salix, 3.5 m in cattails, MUAS at water's edge & on sandy bank.	25
				2009	Willows located; all about 8-10' tall in cattails. Healthy plants.	6-25
139	398187	4076309	2 culverts to mazourka canyon	2008	~15, 1st yr salix in ANCA, MUAS, ELAN, DISP. Very moist soil.	15
				2009	Revisit #R139; 1-3 year old red willows located along old point bar, 1-3' tall, moderately browsed	26-100
176	398246	4076200	Two Culverts to Mazourka	2008	Willow seedlings, 10 plants, 1m tall.	10
				2009	6-25 SAGO plants, less than 1m tall	6-25
177	398692	4075276	Two Culverts to Mazourka	2008	Willow seedlings, 15 plants, 1m tall.	15
				2009	SAGO and SALA recruitment still visible	Unknown
157	398944	4073695	Two Culverts to Mazourka	2008	Willow recruitment ~ 50 plants, likely 2 cohorts, SAGO, also POFR (2).	50
				2009	SAGO yearlings and seedlings, TARA also, greater than 1 year ELAN also.	Unknown
140	398996	4073622	South of Mazourka	2008	7 Salix mixed in w/ DISP and CHNA.	7
				2009	7 yearling Gooding willows	6-25
141	399094	4073486	South of Mazourka	2008	POFR in same sidebar as wypt 82. Extensive recruitment of salix.	Unknown
				2009	willow recruitment, whitethorn acacia, a russian olive, no cottonwood	26-100
142	399117	4073455	South of Mazourka	2008	Side bar w/ >=25 willow recruits ~ 0.5-1m. Moist, DISP, coyote willow, tree willows, cattails.	25+
				2009	Revisit #R142, willows in water, TARA 1m tall	1-5

Table 2, continued. 2009 Woody Recruitment Revisit Sites Compared to 2008 Observations

Revisit Sites Woody Recruitment Compared to 2008 Observations						
Revisit Site No.	**Easting**	**Northing**	**General Survey Area**	**Year**	**Observer Comments**	**Abundance**
Mazourka Canyon Road to Manzanar Reward Road						
102	399355	4073258	South of Mazourka	2008	Current year (2008) seedlings SALA3 & SAGO, mixed w/ TARA. Many plants up to 1 m tall at river edge continuing to point 006.	Unknown
				2009	still a lot of TARA, pulled it. Willow seedlings	26-100
103	399362	4073234	South of Mazourka	2008	1 POFR seedling from point 006 on, SAGO, SALA3, SAEX, TARA to point 007. Lots of bullfrogs.	1+
				2009	POFR, willows and TARA (pulled) still here	1+
93	399236	4072556	South of Mazourka	2008	30 plants, SALA3 & SAGO from point to point 019.	30
				2009	Revisit #R93, 1 resprout/1 seedling	1-5
100	399273	4072341	South of Mazourka	2008	25 plants SAGO, 2-3m tall w/ TARA seedlings.	
				2009	Revisit #R100, 7 1m SAGOs and one 1m TARA	1-5
99	399274	4072306	South of Mazourka	2008	5 plants, SAGO up to 1m tall.	5
				2009	SAGOs still here	1-5
101	399278	4072263	South of Mazourka	2008	5 plants SAGO, up to 1m tall.	5
				2009	1 willow still there (very inundated)	1
159	399883	4071832		2008	100s of willow seedlings, likely SAGO.	>100
				2009	Revisit #159, SALA3 seedlings, very inundated. No vigorous yearling growth.	>100
105	399492	4071752	South of Mazourka	2008	20+ SAGO seedlings, less than 1m tall, 30+ TARA seedling up to 1m tall.	20+
				2009	Revisit #R105, still here SAGO and TARA seedlings	20+
106	399498	4071732	South of Mazourka	2008	30+ SAGO seedlings up to 1m tall.	30+
				2009	Revisit #R106, 100+ TARA seedlings and 50+ SAGO seedlings.	6-25
107	399698	4071648	South of Mazourka	2008	150+ plants SAGO along marshy bank.	150+
				2009	50+ 1 yr SAGOs growing in spike brush	50+
108	400006	4070349	south of mazourka rd	2008	8 plants, SAGO, SALA3, SALA6.	8
				2009	Revisit #R108; not treated	Unknown
18	400077	4070191	23.0	2008	Possibly red willow; ~12" tall; 6+ other tree willow seedlings from this year seen; disturbed sandy areas.	7
				2009	SALA3 recruitment, all 1-1.5m tall	6-25
85	399988	4070129	south of mazourka rd	2008	FID 084. Few of many seedling appear to have survived.	<5
				2009	Revisit #R85; 1 Salix found, mild browse, .5m tall	1
20	400097	4070070	23.0	2008	Tree willow sapling ~1.5m tall; 2 others near by.	3
				2009	SALA3 growing among TARA and TARA slash. 1-2m tall	1-5
16	399971	4068777	23.0	2008	At least a dozen young SAEX up to 20m from bank.	12+
				2009	wdy; SAEX up to 10m up bank. Area looks great	26-100
17	400053	4068496	23.0	2008	Several, ~15, young SAEX in grassy area up to 6m from river bank.	15
				2009	SAEX from bank to 6+m on to floodplain	26-100
21	400391	4068264	south of mazourka canyon rd.	2008	~15 young SAEX, all <1m; growing on steep, DISP-covered bank.	15
				2009	Revisit #R21, wdy; Approx. 15 new SAEX seedlings. Approx. 8 1-yr SAEX on bank w/DISP, ANCA, some ATTO.	6-25
22	400460	4068000	south of mazourka canyon rd.	2008	5 small SAEX ~0.5m high, in grassy bank.	5
				2009	Revisit #R22, wdy; SAEX on grassy bank. Approx. 10 new SAEX seedlings, approx. 10 1-yr SAEX	6-25
178	400382	4067977	south of mazourka rd	2008	Willow seedlings, 1m tall, 5-10 plants.	5
				2009	too numerous to count/ road reveg nicely	Many
24	400636	4067866	south of mazourka canyon rd.	2008	~25 young SAEX at bottom of steep slope and in grassy area.	25
				2009	Revisit #R24 wdy; <5 1-yr SAEX. 15 2+yr SAEX. No new SAEX seedlings. Thick scripus at toe of slope, slope dry.	20
27	400853	4067546	south of mazourka canyon rd.	2008	Sapling POFR in phragmites stand; ~7ft tall.	1
				2009	Revisit #R27 wdy; sapling POFR approx. 9' tall (3m). In phragmites stand, scirpus beyond	1-5
23	400625	4067539	south of mazourka canyon rd.	2008	Many young SAEX inside bend of river, grassy site.	Unknown
				2009	Revisit #R23 wdy; 5 seedlings SAEX. 10 1-yr SAEX in TYLA. Scirpus behind at water edge	1-5
26	400832	4067502	south of mazourka canyon rd.	2008	Many, 50+, young SAEX on bank in grassy area.	50+
				2009	Revisit #R26 wdy; 15 SAEX seedlings. Approx. 35 1-yr SAEX on edge of oxbow pond on steep bank. TYLA, some scripus	6-25
25	400766	4067479	south of mazourka canyon rd.	2008	Sapling POFR, growing amongst bulrush, ~5'8" tall.	1
				2009	Revisit #R25 wdy; sapling POFR. Approx. 2m in standing water with scirpus	1-5

Table 2, continued. 2009 Woody Recruitment Revisit Sites Compared to 2008 Observations

Revisit Sites Woody Recruitment Compared to 2008 Observations						
Revisit Site No.	**Easting**	**Northing**	**General Survey Area**	**Year**	**Observer Comments**	**Abundance**
Manzanar Reward Road to Reinhackle Measuring Station						
166	401224	4065772	below manzanar reward, east side	2008	100-150 SAGO to 2 m tall. Some plants may be 2007 recruits.	>100
				2009	SAGO/SALA3 population, 1-3m tall on floodplain with ATTO, DISP, no TARA-seed.	>100
168	401778	4065444	below manzanar reward, east side	2008	9 seedlings > 1m tall, SAGO.	9
				2009	5+ SAGO seedlings 1-5m tall in TYLA	1-5
167	401768	4065427	below manzanar reward, east side	2008	40 seedlings >1m tall, SAGO.	40
				2009	10+ SAGO near channel. Area becoming inudated, TYLA encroaching	6-25
50	401728	4065077	south of Manzanar Reward Road	2008	SAEX recruitment on west side of river. 40+ seedlings up to +/- 1 meter tall, sandy bank.	40+
				2009	wdy; 50+ willow seedlings and larger	26-100
179	401729	4065068	south of Manzanar Reward Road	2008	Willow seedlings, 1m tall, 10-15 plants.	10-15
				2009	wdy; 50+ willow seedlings and larger	26-100
51	401902	4065046	south of Manzanar Reward Road	2008	Mixed tree willow recruitment, 50+, sandy area.	50+
				2009	wdy; <25 willow seedlings and some larger	6-25
52	401998	4064800	south of Manzanar Reward Road	2008	50+ tree willow seedlings along oxbow bank margins.	50+
				2009	wdy; no willow recruitment at all.	0
53	402015	4064708	south of Manzanar Reward Road	2008	POFR recruitment, 3+ feet, 2 individuals on cutbank of right river slope.	2
				2009	wdy; no POFR (flooded area)	0
54	402028	4064672	south of Manzanar Reward Road	2008	SAGO recruitment w/in old oxbow, 2 individuals.	2
				2009	wdy; approx. 5 willows >1m tall	1-5
55	402031	4064589	south of Manzanar Reward Road	2008	Tree willow recruitment up to 1 meter tall, 10+ individuals.	10+
				2009	7 willow seedlings and 1 larger	6-25
56	402045	4064337	south of Manzanar Reward Road	2008	Tree willow recruitment w/in wet meadow, 30+ seedlings.	30+
				2009	no willow seedlings, flooded area	0
57	402105	4064146	south of Manzanar Reward Road	2008	Woody salix recruitment along muddy river bank.	Unknown
				2009	1 1m tall willow	1-5
58	402125	4064128	south of Manzanar Reward Road	2008	SAGO recruitment along bank. Seedlings and saplings. Tree willow recruitment in wet meadow, 300+ seedlings.	300+
				2009	wdy; 25+ willow seedlings	26-100
59	402160	4063990	south of Manzanar Reward Road	2008	POFR seedlings and multiple tree willow seedlings (40+).	40+
				2009	wdy; 25+ willow seedlilngs	26-100
169	402267	4063794	below manzanar reward, east side	2008	70 seedlings, SAGO, >1m tall, low area ~1-2m from river.	70
				2009	15 SAGO seedlings 1-2m from river (and SALA3) 1 POFR seedling on river channel.	6-25
61	402214	4063790	south of Manzanar Reward Road	2008	2 POFR seedlings ~ 10" tall, 2 tree willow seedlings on narrow muddy bank.	2
				2009	25+ willow seedling, no POFR	26-100
60	402205	4063762	south of Manzanar Reward Road	2008	4 seedling POFR, 100s tree willows in dense wet meadow and at muddy margins of oxbow.	>100
				2009	same as before; willow and POFR seedlings	>100
63	402350	4063682	south of Manzanar Reward Road	2008	2 young tree willows on grassy bank; prob 1-3 yrs old, 0.5m high.	2
				2009	same as before	26-100
64	402490	4063493	south of Manzanar Reward Road	2008	~30-40 young tree willows, <= 12" tall, on narrow exposed muddy area.	30-40
				2009	wdy; same as before	26-100
65	402525	4063459	south of Manzanar Reward Road	2008	Grassy bank lined w/ seedling tree willows < 12" high, 50-100.	50-100
				2009	wdy; same as before	26-100
66	402651	4063327	south of Manzanar Reward Road	2008	Cluster of young tree willows (30 - 40) in river channel.	30-40
				2009	wdy; same as before	26-100
62	402257	4062777	south of Manzanar Reward Road	2008	Several (30-40) young SAEX at base of steep slope.	30-40
				2009	wdy; same as before	26-100
143	402357	4061456	South Manzanar to Islands	2008	~6 salix spaced ~10m apart, heading N. 2 - 4.5m tall in cattails, not sure whether all recruits or resprouts.	6
				2009	willows still persisting	1-5

Table 2, continued. 2009 Woody Recruitment Revisit Sites Compared to 2008 Observations

Revisit Sites Woody Recruitment Compared to 2008 Observations						
Revisit Site No.	**Easting**	**Northing**	**General Survey Area**	**Year**	**Observer Comments**	**Abundance**
Reinhackle Measuring Station to Islands Lease Grazing Exclosure						
117	402806	4060881	south of manzanar reward rd	2008	Black willows at high water line @ gauging stn. - 60 plants. Most small, also other side one TARA seedling, pulled, one red willow found.	61
				2009	More than 5 in tall willows	6-25
149	402782	4060869	South Manzanar to Islands	2008	4-1st yr salix ~0.5 tall in dist soil w/ DISP. To S ~4, 2-3 tr (2 m tall) in DISP, very moist soil	4
				2009	4 SAEX approx. 2' tall	1-5
148	402688	4060574	South Manzanar to Islands	2008	River sandbar w/ ~ 20 1st yr salix <= 1m. MUAS, DISP, SPAI, cattails; moist.	20
				2009	Revisit #R148; mix of red and gooding willows over 1 yr old, Salix seedling closer to water then 1+yrs old in moist soil.	6-25
116	402708	4060524	south of manzanar reward rd	2008	Willow recruitment reported in 2007 now is 30+/- coyote willow.	30
				2009	Revisit #R116; 3 SAEX seedlings. Most willows seen during last visit are gone. Heavy grazing in area	1-5
145	402628	4060273	South Manzanar to Islands	2008	2 salix - 1 yr, 1.5 m tall, river edge in water w/ cattails.	2
				2009	Revisit #R145; SAEX yearlings persisting	1-5
81	402594	4058958	Islands, west side	2008	SAEX spreading into meadow. Not seedlings but young sprouts.	Unknown
				2009	SAEX reprouts still alive in meadow	6-25
46	403965	4057432	Islands	2008	5 young salix tree willows - seedlings on same exposed muddy shore as TARA seedlings.	5
				2009	Revisit #R46; no woody recruitment observed from last year.	0
28	403003	4057263	Islands, west side	2008	6 Gooding willow seedlings to 6" high; muddy edge of receeding waterline.	6
				2009	no sign of SAGO	0
47	403994	4056953	Islands	2008	Willow (SAGO) seedlings 100+ on shoreline-adjacent to mature salix.	100+
				2009	Revisit # R47; no seedlings observed	0
29	403287	4056624	Islands	2008	200+ SAGO seedlings in drying oxbow and at edge of wet oxbow.	200+
				2009	Revisit #R29; no evidence of SAGO seedlings. Dry. TARA seedlings	0
45	403691	4056575	Islands	2008	Several hundred small seedlings & 10 S. goodingii >15cm, all on muddy banks.	300
				2009	unable to locate any seedlings. All seedling-like plants are HECU	0
43	403702	4056497	Islands	2008	10 seedlings (SAGO) below huge adult.	10
				2009	unable to locate any seedlings. Mostly cattail, HECU, uneweed? - almost nightshade like.	0
44	403699	4056418	Islands	2008	S. goodingii, 12 seedlings.	12
				2009	Revisit #R44; unable to locate any seedlings. Mostly LETR/DISP/HECU. Some open ground, but no sign of TARA	0
42	403588	4056352	Islands	2008	Numerous seedlings around exposed dry margin of oxbow.	Unknown
				2009	Revisit #R42; no seedlings/yearlings are observed. Lots of HECU/DISP/Juncus	0
Islands Lease Grazing Exclosure to Lone Pine Depot Road						
150	406914	4054016	South of islands to lone pine depot rd	2008	Salix ~1m. 2nd or 3rd yr. Died back last year.	1
				2009	willow okay	1
Lone Pine Depot Road to Pumpback Station						
121	407765	4051198	S. of Narrow Gauge Rd/Depot Rd	2008	Salix recruit - 2m tall (several)	3
				2009	S. laevigata recruits (4). 3-4m tall along bank.	4
Delta Habitat Area- Wetland Sites						
RW20	412829	4043169	Delta	2008	More willow recruitment north of waypt.	Unknown
				2009	Revisit #R20?; yearling SAEX	6-25
RW26	412885	4043080	Delta	2008	Many small less than 2m salix saplings. 20cm-200cm tall, along river's edge, associated with sedges, some resprout of older dead ones.	Unknown
				2009	Revisit #R26?; yearling SAEX	6-25
Blackrock Waterfowl Management Area- Wetland Sites						
RW57	392024	4083257	Eastside of Winterton Slough	2008	SAEX, TARA, SALA3 recruitment in and along ditch, also POFR.	Unknown
				2009	Revisit #RW57. 2 ELAN? No other woody recruitment nearby	1-5
RW59	392300	4083346	Eastside of Winterton Slough	2008	SAEX, SALA3, POFR (6), 100's of willow (spreading basin)*	300
				2009	Revisit #RW59. + 10 SAGO plants <1m tall	6-25

4.13.3. Appendix 3. Rapid Assessment Photos

Photo 1. Extensive stands of decadent bassia between Blackrock Ditch and Two Culverts.

Photo 2. Photo of Common reed (*Phragmites australis*) stand in the LORP area.

Photo 3. Rehabilitated road near Intake. Saltgrass is revegetating area. No signs of vehicle traffic.

Photo 4. Rehabilitated road near the Intake. Light use was noted during the 2009 RAS.

Photo 5. Rehabilitated road near the Intake with some flooding and resource damage.

Photo 6. River banks at old road crossing near Blackrock Ditch are still barren.

Photo 7. Open gate on the west side of the Owens River, east of Lone Pine. Evidence of off-road vehicle traffic through this gate was noted.

Photo 8. New vehicle tracks at south end of Delta Habitat area.

Photo 9. Area of tamarisk recruitment in the Islands area first noted in 2008

Photo 10. Tamarisk seedling recruitment near the Pumpback Station.

Photo 11. Tamarisk slash just downstream of the Intake.

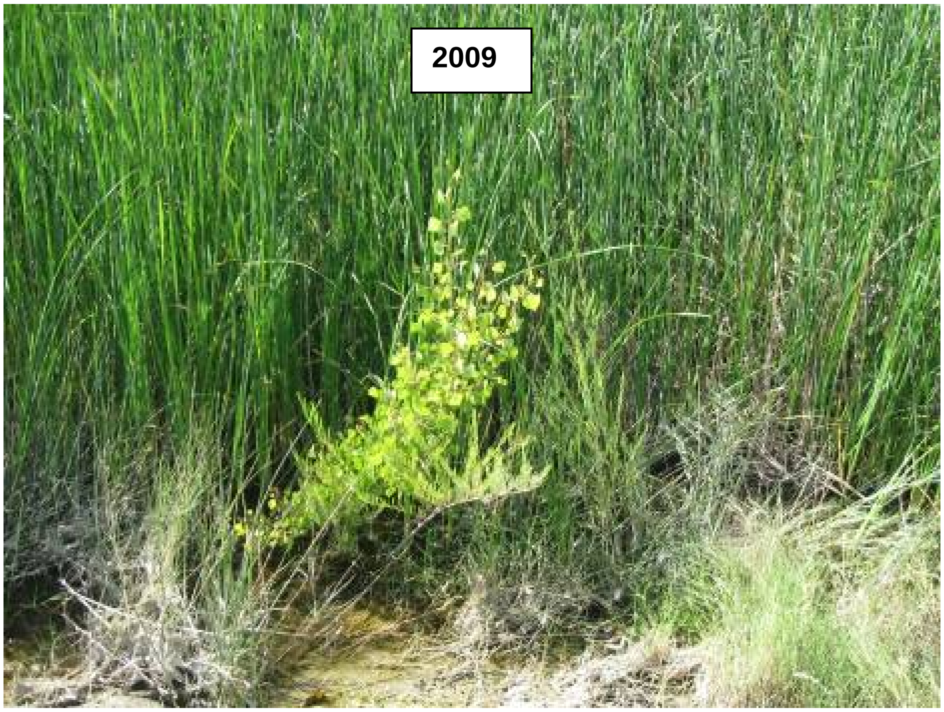
Photo 12. Owens Valley vole droppings along runway at site between Intake and Two Culverts (River Mile 7.5).

Photo 13. Sandy bank downstream from Blackrock Measuring Station at River Mile 5.6 that supported approximately 300 seedling tree willows in 2009.

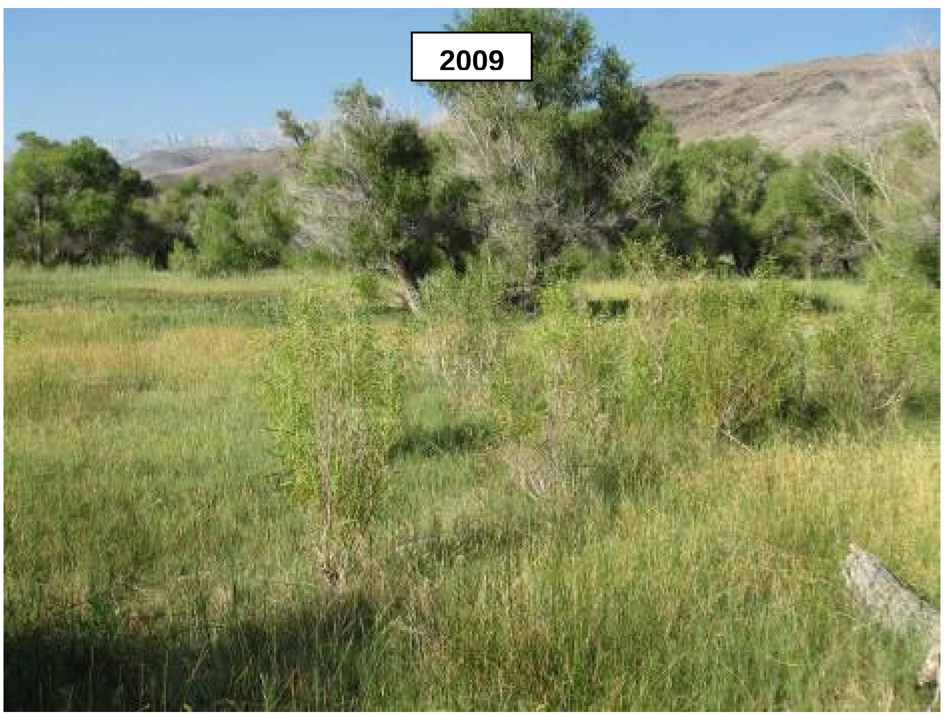
Photo 14. Cut bank near River Mile 10.5. Another cut bank was observed at River Mile 11.7. Both areas are between Blackrock Ditch to Two Culverts, just north of the Thibaut Riparian Exclosure.

Photo 15. Solid tules and cattails in the channel in the Thibaut Riparian Exclosure, north of Two Culverts.

Photo 16. Woody recruitment revisit site where saplings at river's edge are now inundated.



Photos 17 and 18. Cottonwood survival at revisit site south of Blackrock Ditch.



Photos 19 and 20. Willow survival at revisit site on the west side of the Islands.

5.0 HYDROLOGIC MONITORING

5.1. River Flows

On July 12, 2007 a Court Stipulation & Order was issued requiring LADWP to meet specific flow requirements for the LORP. From the issue date through September 2009 LADWP has been in compliance with the flow requirements outlined in the Stipulation & Order and listed here:

1. Minimum of 40 cfs released from the Intake at all times.
2. None of the 10 in-river measuring stations has a 15-day running average of less than 35 cfs.
3. The mean daily flow at each of the 10 in-river measuring stations must equal or exceed 40 cfs on 3 individual days out of every 15 days.
4. The 15-day running average of the 10 in-river flow measuring stations is no less than 40 cfs.

The flow data shown in the graphs at the end of the Hydrographic Summary show LADWP was in compliance with the Stipulation & Order at all times (see Appendix 5A – Additional Hydrologic Monitoring Graphs).

On July 14, 2009, 6 of the 10 in-river measuring stations were taken out of service, while the LORP Intake, Mazourka Canyon Road, Reinhackle Springs, and Pumpback Stations remained in service.

Hydrologic Monitoring Table 1. LORP Flows – Water Year October 2008-September 2009

LORP Flows: Water Year 2008-09			
STATION NAME	**Average Flow (cfs)**	**Maximum Flow (cfs)**	**Minimum Flow (cfs)**
Below River Intake	56.0	105	41.3
Above Blackrock Return*	49.7	96	35.3
Blackrock Return Ditch	2.5	8	1.01
East of Goose Lake*	50.8	93	37.3
Goose Lake Return	0.9	2	0.38
Two Culverts*	49.8	99	38.3
Billy Lake Return	1.0	3	0.22
Mazourka Canyon Road	52.8	83	38.3
Locust Ditch Return	0.0	0	0
Manzanar Reward Road*	53.3	85	37.3
Georges Ditch Return	0.9	9	0
Reinhackle Springs	53.4	86	38.3
Alabama Gates Return	0.3	10	0
Lone Pine Narrow Gage Road*	47.0	72	36.3
Keeler Bridge*	48.9	66	37.3
Pumpback Station	43.1	48	21.2
Langemann Gate to Delta	5.0	25	2.02
Weir to Delta***	1.8	18	0
Flow to Brine Pool (east branch)**	3.5	9	0.9
Flow to Brine Pool (west branch)**	0.2	0.34	0.04

**Measuring stations were removed July 14, 2009. Average is from October 1, 2008 to July 12, 2009*
***Delta measuring stations were removed April 1, 2009. Average is from October 1, 2008 to March 31, 2009.*
**** Weir to Delta averaged 1.7 cfs when the seasonal habitat flows are subtracted.*

5.1.1. Web Posting Requirements

The Stipulation & Order also outlined web posting requirements for the LORP data. LADWP has met all the posting requirements for the daily reports, monthly reports, and real time data.

Daily reports listing the flows for the LORP, Delta flows, BWMA wetted acreage, and Off-River Lakes and Ponds depths are posted each day on the web at http://www.ladwp.com/ladwp/cms/ladwp009121.jsp.

Monthly reports summarizing each month and listing all of the raw data for the month are posted to the web at http://www.ladwp.com/ladwp/cms/ladwp009817.jsp.

Real time data showing flows at the Intake, Owens River at Mazourka Canyon Road, Owens River at Reinhackle Springs, and Pumpback Station are posted to the web at http://www.ladwp.com/ladwp/aqueduct/showAqueductMap.ladwp?contentId=LADWP_AQUERTD_SCID under the 'Lower Owens River Project' link.

5.1.2. Measurement Issues

LORP flows are mostly measured using Sontek SW acoustic flow meters. All of the Sontek SW meters along the LORP are mounted on the bottom of the river channel. These devices are highly accurate and final records for the LORP generally fall within normal water measurement standards of +/- 5%.

Any factors which change the levels or velocities in the river also affect the accuracy of the Sontek meters. Seasonal changes such as spring/summer vegetation growth causing water levels to increase and velocities to decrease are one such factor. Another factor is sediment build up. As a band of sediment builds up on or near the measuring station section, the water levels of the section can increase or velocities can be shifted--both of which affect the accuracy of the Sontek meters. Gas bubble formation under the Teranap Geomembrane artificial mats located at the Above Blackrock Return, East of Goose Lake, and Reinhackle Springs stations is yet another factor which causes water level and velocity changes.

In order to account for these environmental changes, LADWP manually measures flow at all of the stations along the LORP to check the accuracy of the meters. Each time a current metering is done, a 'shift' is applied to the station to take into account the difference in flow determined by the current metering. If a fundamental change in the flow curve is observed then a new index is created from the current metering data and downloaded to the meter. All of the meters on the LORP are calibrated at a minimum of once per month to maintain the accuracy of the meters.

A commentary on each station along the LORP follows:

LORP Intake

Measurement Devices: Langemann Gate & WaterLOG H-350XL Bubbler System
The Langemann Gate regulates and records the flow values at the Intake. This has had very good accuracy and reliability as long as the gate does not become submerged (submergence may be possible at higher flows such as when the seasonal habitat flows are released). In case of submergence, the WaterLOG H-350XL was installed as a back up to the Langemann Gate measurement. The WaterLOG H-350XL is a bubbler system that uses pressurized air to measure stage, which is applied to a rating curve. The bubbler system allows for an accurate measurement of stage even in silt/sediment conditions. However, any system of water measurement using stage must be calibrated through the full range of flows and in similar

seasonal conditions in order for measurements to be accurate. Calibrating the bubbler for seasonal habitat flows may be difficult in the upcoming year and likely won't give accurate results until data points can be collected to allow a good flow curve to be established for the higher flows which exceed 150 cfs.

<u>LORP at Above Blackrock Return</u>

Measurement Device: Sontek SW Meter
This meter was installed on one of the artificial mats mentioned above. Gas under the mat and sediment build-up continued to be a problem until the station was retired on July 14, 2009.

<u>LORP at East of Goose Lake</u>

Measurement Device: Sontek SW Meter
This meter was installed on one of the artificial mats mentioned above. Gas under the mat and large sediment build up continued to be a problem until the station was retired on July 14, 2009.

<u>LORP at Two Culverts</u>

Measurement Devices: Two Sontek SW Meters
The meter section at this station consisted of two culverts, each having a Sontek SW meter placed on the bottom. Overall, this station performed well until it was retired on July 14, 2009.

<u>LORP at Mazourka Canyon Road</u>

Measurement Devices: Two Sontek SW Meters
This section consists of two culverts and results have been similar to the experiences at the Two Culverts station. The culverts here are older compared to those at Two Culverts, but are in good condition. Design is in progress for the construction of a permanent flow section. It is anticipated that the flow will be measured with a WaterLOG bubbler system or a Sontek SW flow meter in a concrete measuring section.

<u>LORP at Manzanar Reward Road</u>

Measurement Devices: Two Sontek SW Meters
This section also consisted of two culverts. The culverts here were older, smaller in size, and were placed on a steep slope. This combination caused high velocities and turbulent flows, so the 'shifts' applied by the manual current metering were much higher here than at the other stations. LADWP had a few electronic issues with the Sontek SW flow meters at this location and as a result, an In-Situ Level TROLL 500 was installed to measure stage and applied to an established rating curve. This combination provided excellent results in flow measurement until the station was retired on July 14, 2009.

<u>LORP at Reinhackle Springs</u>

Measurement Device: Sontek SW Meter
This meter is installed on one of the artificial mats mentioned above. Sediment build up exist here, but is not a major problem. This station also experiences major problems with the formation of gas bubbles and the mat must be closely monitored so the gas bubbles can be addressed soon after they form. Design is in progress for the construction of a permanent flow section. It is anticipated that flow will be measured with a WaterLOG bubbler system or a Sontek SW flow meter in a concrete measuring section.

LORP at Lone Pine Narrow Gage Road

Measurement Devices: Two Sontek SW Meters
The meter section at this station consisted of two culverts, each having a Sontek SW meter placed in the bottom. These culverts generally provided a good measuring section, but a major problem of sediment build-up existed. A large investment of manpower has been made at the site to correct sediment issues, which sometimes quickly reoccurred. Also the water in these culverts tended to be fairly deep, which caused safety concerns when crews tried to clean sediment out of the culverts. This station was retired on July 14, 2009.

LORP at Keeler Bridge

Measurement Device: Sontek SW Meter
This meter is installed in a concrete measuring section. The defined concrete section and laminar flow profile provides ideal conditions for water measurement. Also, very few sediment problems existed at this station. Other than the Langemann Gate at the Intake, this section was the most accurate and reliable in the LORP. This station was retired from the LORP monitoring system on July 14, 2009. The station continues to operate to preserve the continuity of the lengthy record at this location.

LORP at Above Pumpback Station

Measurement Devices: Pump Station Discharge Meter, Langemann Gate, Weir
The flow at the Above Pumpback Station is a calculated flow resulting from adding the Pump Station's electronic discharge flow meter, Langemann Gate Release to Delta, and Weir to Delta. In most flow conditions these stations have proven to be very accurate. However, during the higher flows of the seasonal habitat flows in February of 2008 and during the Delta seasonal habit flow of September 2009, the Weir and/or Langemann Gate can become submerged thus lowering the measuring accuracy of the submerged device.

5.2. Flows to the Delta

The flows to the Delta have been managed in a manner to average 6 to 9 cfs in each year (Hydrologic Monitoring, Figures 1 and 2), as called for in the LORP EIR. During winter months, the flows were lowered to as low as 3 cfs and during the summer was set to as high as 6 cfs. The average flow to the Delta, after removing the seasonal habitat flows, for the water year 2008-09 (October 2008 to September 2009) was 6.7 cfs.

Based upon a review of the flow to Brine Pool and flow to Delta data and after filtering out the noise of unintended spillage at the Pump Station, the flows to the Delta will be set to the following approximate schedule (per the LORP EIR, section 2.4) for the 2009--10 water year:

- October 1 to November 30: 4 cfs
- December 1 to February 28: 3 cfs
- March 1 to April 30: 4 cfs
- May 1 to September 30: 7.5 cfs

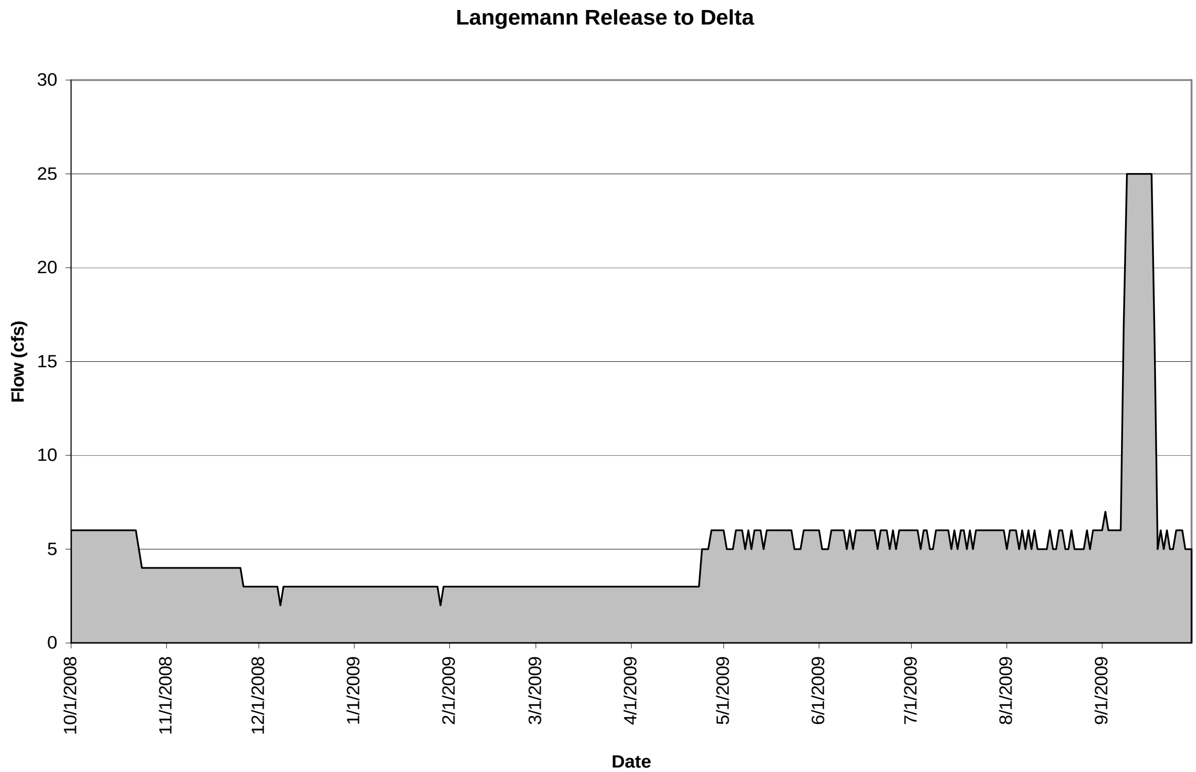
Additionally, pulse flows will be released to the Delta (LORP EIR, section 2.4):

- Period 1: March-April 10 days at 25 cfs
- Period 2: June-July 10 days at 20 cfs
- Period 3: September 10 days at 25 cfs
- Period 4: November-December 5 days at 30 cfs

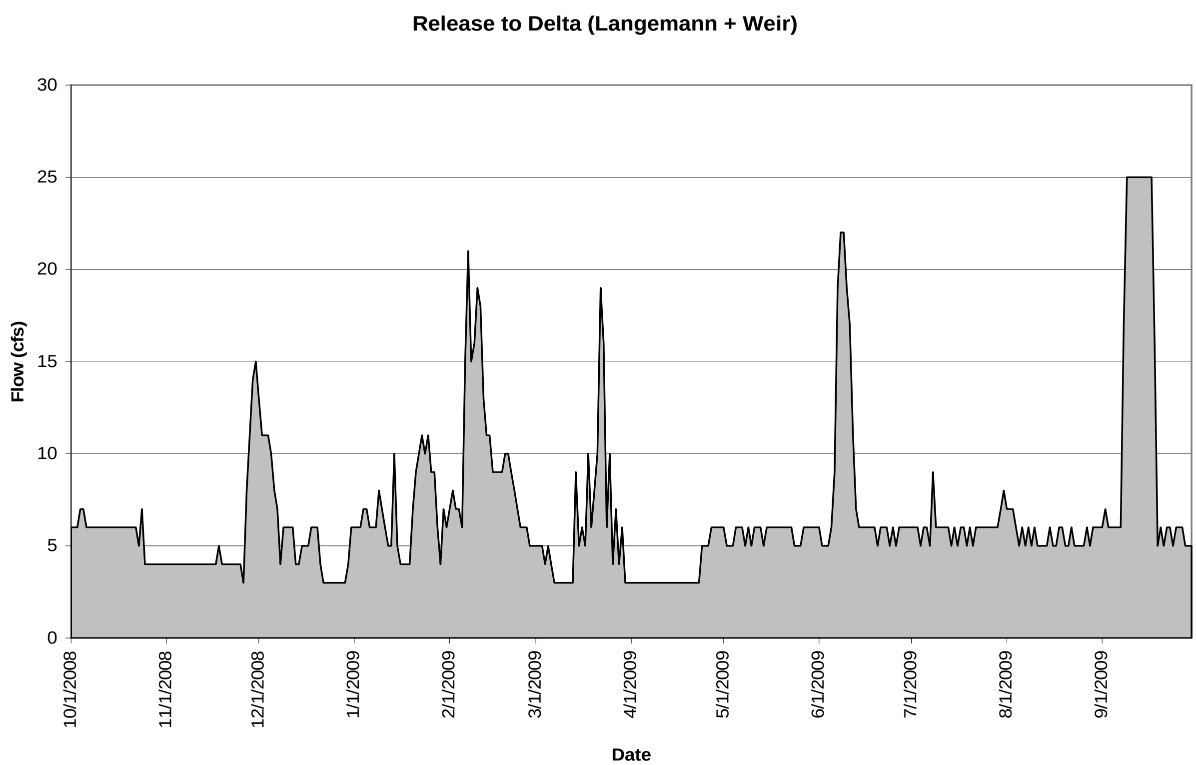
The first of the pulse flows was released from September 8 to September 18, 2009 and was set to 25 cfs for the entire period.

Unintended flows are also released to the Delta when intense rain storms occur causing river flows to exceed the limited maximum capacity at the Pumpback Station or when pump outages occur at the Pumpback Station.

The scheduled base and pulse flows for the 2009-10 water year will send an average of 6.2 cfs to the Delta, with unintended spilling adding approximately 1.6 cfs if the historical trend continues.



Hydrologic Monitoring Figure 1. Langemann Release to Delta

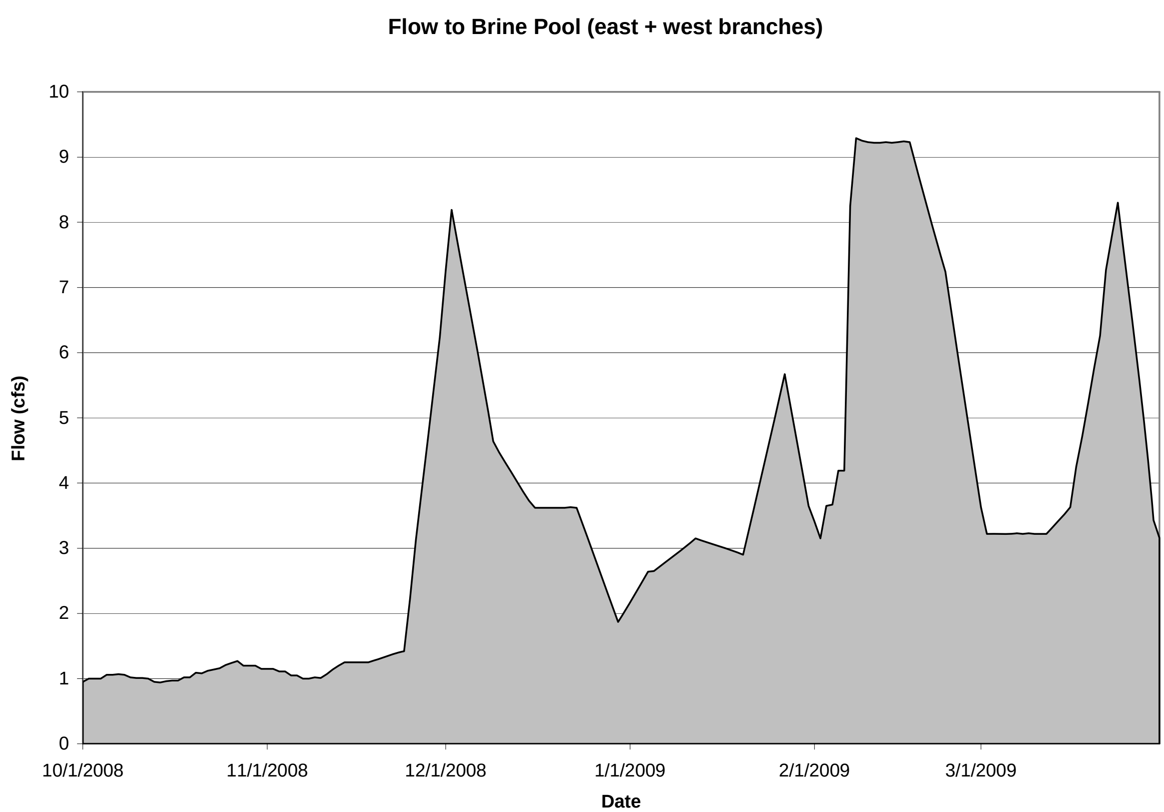


Hydrologic Monitoring Figure 2. Release to Delta (Langemann + Weir)

5.3. Flows to the Brine Pool

Flows had been recorded coming out of the Delta to the Brine Pool at two stations (east and west branches) since July 2007, and flows were adjusted at the Pumpback Station Langemann Gate to maintain approximately 0.5 cfs flow going into the Brine Pool. The average flows into the Brine Pool were actually much higher (over 5 cfs) from the Stipulation & Order date of July 12, 2007 until the stations were removed from service on April 1, 2009. Most of the excess came from flows due to winter rainfall and the flushing flows which occurred in the winter months. During the period of March to September 2008 the flow to the brine pool averaged 0.5 cfs and from September 2008 to March 2009 the flow to the brine pool averaged 3.6 cfs.

The Stipulation & Order required LADWP to continuously record the flow data going into the brine pool for a year. On three separate occasions in fall and winter of 2007-2008 the measuring stations in the Delta were washed out due to high flows (twice from rain and once from the flushing flows). The stations were established for the fourth time in March 2008, and no further problems were experienced. LADWP abandoned the stations after the full year of flow recordings were established on April 1, 2009.



Hydrologic Monitoring Figure 3. Flow to Brine Pool (east + west branches)

5.4. Off-River Lakes and Ponds

The BWMA and Off-River Lakes and Ponds Hydrologic Data Reporting Plan requires that Upper Twin Lake, Lower Twin Lake, and Goose Lake be maintained between 1.5 and 3.0 feet on their existing staff gauges, and that Billy Lake be maintained full (i.e., at an elevation that maintains flow from the lake). At no time during the period of October 2008 to September 2009 did any of the gages indicate below 1.5 feet (Hydrologic Monitoring Figure 4).

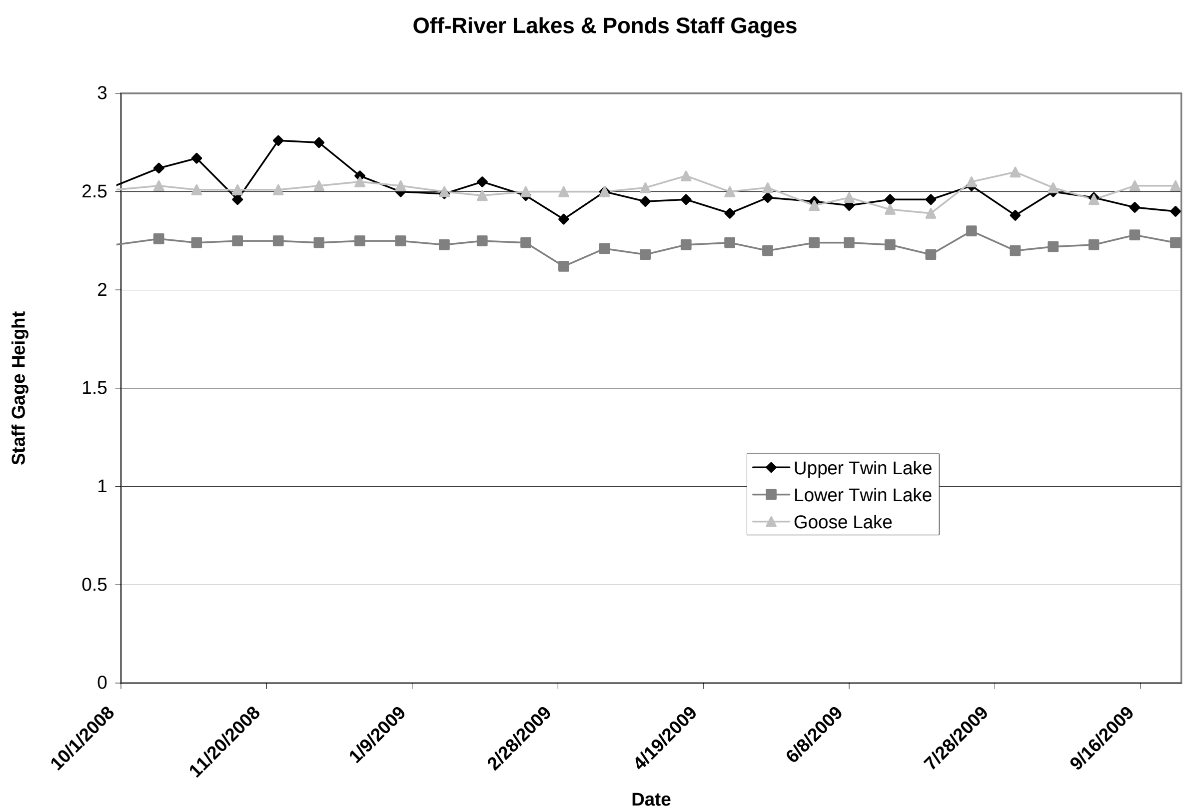
Billy Lake

Due to the topography of Billy Lake in relation to the Billy Lake Return station, whenever the Billy Lake Return station is showing flow, Billy Lake is full. LADWP maintains Billy Lake by monitoring the Billy Lake Return station to always ensure some flow is registering there. When referring to the table showing the annual summary of flows, at no time did the flow at Billy Lake Return Station fall to zero for a day, Billy Lake remained full for the entire year.

Thibaut Pond

Thibaut Pond is contained completely within the Thibaut Unit of the Waterfowl Area. Each day the Thibaut Unit wetted acreage and the Thibaut Pond acreage is posted to the web in the LORP daily reports found at: http://www.ladwp.com/ladwp/cms/ladwp005341.jsp.

Any time the Thibaut Unit is showing wetted acreage above zero, Thibaut Pond is full. For the water year of October 2008 to September 2009, Thibaut Unit showed wetted acreage above zero at every read point, so Thibaut Pond was full for the entire period.



Hydrologic Monitoring Figure 4. Off-River Lakes & Ponds Staff Gages (October 2008-09)

5.5. Blackrock Waterfowl Management Area

The operations for the BWMA changed beginning in spring 2009, so the analysis of the waterfowl areas have been broken up into two sections, one describing the 2008-09 runoff year (April 2008 to March 2009) results and the next describing the new operation procedures and results for the first half of the 2009-2010 runoff year (April 2009 to September 2009).

5.5.1. Waterfowl Results for Runoff Year 2008-09 (April 2008 to March 2009)

Wetted Acreage for the BWMA was measured using GPS devices every 2 weeks for the entire runoff year (April 2008 to March 2009). The requirement for flooded acreage based on the April 1 snow survey (81% of normal) was 430 acres. The average measured wetted area was 494 acres (Hydrologic Monitoring Table 2).

Hydrologic Monitoring Table 2 Blackrock Waterfowl Wetted Acreage Measurements 2008-09

Winterton Unit Wetted Acreage	
April 2008 to March 2009	
READ DATE	**WETTED ACREAGE**
4/2/2008	135
4/10/2008	106
4/16/2008	81
4/21/2008	67
4/28/2008	59
5/8/2008	63
5/14/2008	37
5/29/2008	135
6/5/2008	138
6/12/2008	118
6/26/2008	111
7/10/2008	109
7/16/2008	108
7/24/2008	117
8/6/2008	126
8/20/2008	116
9/3/2008	159
9/16/2008	184
10/1/2008	208
10/16/2008	225
10/30/2008	172
11/12/2008	172
11/25/2008	164
12/9/2008	165
1/5/2009	170
1/22/2009	164
2/5/2009	165
2/19/2009	176
3/4/2009	166
3/19/2009	159

Thibaut Unit Wetted Acreage	
April 2008 to March 2009	
READ DATE	**WETTED ACREAGE***
4/9/2008	197
4/14/2008	238
4/22/2008	273
4/29/2008	279
5/14/2008	304
5/20/2008	658
6/5/2008	568
6/11/2008	606
6/25/2008	560
7/9/2008	590
7/16/2008	479
7/23/2008	493
8/1/2008	497
8/15/2008	404
8/28/2008	355
9/9/2008	133
9/25/2008	43
10/9/2008	47
10/21/2008	174
11/7/2008	453
11/19/2008	511
12/3/2008	544
12/31/2008	493
1/15/2009	332
1/30/2009	240
2/12/2009	223
2/27/2009	188
3/11/2009	48
3/26/2009	154

** Does not include the 28 acres of Thibaut Pond.*

5.5.2. Waterfowl Results Runoff Year 2009-10 (April 2009 to September 2009)

For the 2009-10 Runoff Year (April 2009 to March 2010), the data collection and operations changed for the BWMA. Beginning in April 2009, flows have been set based upon previous data relationships between inflows into an area and the resulting wetted acreage measurements during each of four seasons based on evapo-transpiration rates. The seasons are defined as:

Spring	April 16 – May 31
Summer	June 1 – August 15
Fall	August 16 – October 15
Winter	October 16 – April 15

Wetted acreage measurements are to be collected eight times per year, once in the middle of each season and once at the end of each season. The measurement in the middle of the season counts as the average for the entire season with the data collection points at the beginning of each season being used as reference points for establishing inflow vs. wetted acreage relationships.

The waterfowl areas were also rotated for the 2009-10 runoff year, with Thibaut and Winterton being taken out of service and Drew and Waggoner being flooded. Due to the April 1 runoff forecast (71% of normal) the goal for total average wetted acreage was 355 acres. Through the fall of 2009 (the mid-fall measurement was taken in September), the average wetted area for the year was 373 acres.

Winterton Unit

ET Season	READ DATE	WETTED ACREAGE	Inflow(cfs)
Winter	4/1/2009	157	2
	4/13/2009	162	2
Spring	5/6/2009	55	0
	5/29/2009	9	0
Summer	7/9/2009	205**	6
	8/13/2009	158	3
Fall	9/22/2009	0**	0

Thibaut Unit

ET Season	READ DATE	WETTED ACREAGE*	Inflow(cfs)
Winter	4/8/2009	118	1
	4/21/2009	175	0.3
Spring	5/8/2009	83	0.3
	5/28/2009	3	0.3
Summer	7/9/2009	56	2
	8/13/2009	10	1
Fall	9/24/2009	24	1

Drew Unit

ET Season	READ DATE	WETTED ACREAGE	Inflow(cfs)
Winter	4/1/2009	0	0
Spring	5/11/2009	44**	2.4
	5/26/2009	56	2.4
Summer	7/1/2009	161**	4.8
	8/13/2009	230	4.8
Fall	9/22/2009	252**	4.7

Waggoner Unit

ET Season	READ DATE	WETTED ACREAGE	Inflow(cfs)
Winter	4/1/2009	0	0
Spring	5/12/2009	45**	3.2
	5/27/2009	66	3.2
Summer	7/1/2009	110**	5.5
	8/11/2009	162	5.5
Fall	9/22/2009	165**	5.3

** This acreage does not include the 28 acres of the Thibaut Pond area.*
*** These measurements count towards the runoff year acreage goal.*

Hydrologic Monitoring Table 3.. Blackrock Waterfowl Wetted Acreage Measurements 2009-10

The Drew and Waggoner areas were first flooded and took much longer than anticipated to saturate and provide enough wetted acreage to meet the goals for the year, so Winterton was turned back on for part of the summer season to help boost the wetted acreage until Drew and Waggoner finally finished filling up. Drew and Waggoner attained expected wetted acreages around mid-August. The wetting period for these two waterfowl areas was around four months.

The inflows for the spring and summer seasons and the resulting wetted acreages were:

Waterfowl Area	ET Spring Inflow (cfs)	Wetted Acres
Drew	2.4	44
Waggoner	3.2	45
	Spring Average	89 acres

Waterfowl Area	ET	Summer Inflow (cfs)	Wetted Acres
Drew		4.8	161
Waggoner		5.5	110
Winerton	3.9		205
		Summer Average	476 acres

The final fall inflow data will not be complete until flow data is collected for the period through October 15, but the Drew area wetted acreage for fall was 252 acres (with 4.7 cfs inflows) and the Waggoner area wetted acreage was 165 acres (with 5.3 cfs inflows) for a total of 417 acres.

5.5.3. Avian Use of Drew and Waggoner Units 2009

Watershed Resources staff conducted a single day bird census in the Drew and Waggoner Units of the BWMA. The censuses were conducted on August 27 and 28, approximately four months after the initiation of flooding. Both units were burned in February of this year to remove thick decadent stands of emergent vegetation and shrubs, prior to the release of water in April. Bird monitoring in the BWMA was not required this year under the *LORP Monitoring and Adaptive Management Plan*, large numbers of water birds have been using the units since at least May. This census provides some documentation of the response of birds to the management actions taken. LADWP thought it was important to record bird use of burned and newly flooded units before dense emergent vegetation dominated the area.

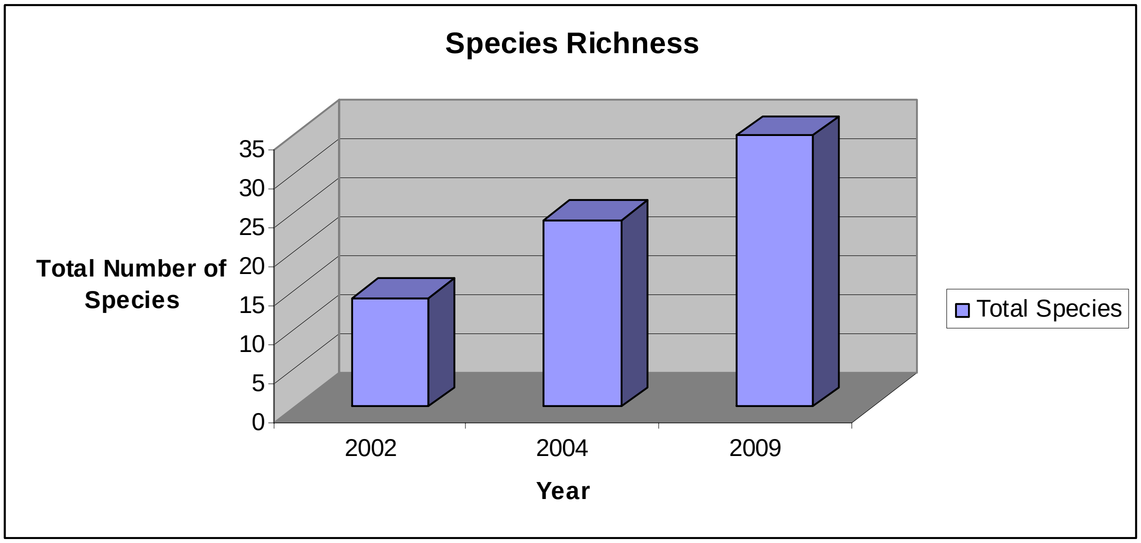
Drew Unit

The flooding in the Drew Unit extended beyond the existing meadow habitat into the shrublands to the north (Nevada saltbrush-rabbitbrush habitat type). Most of Drew was inundated at the time of the survey, and two of the survey stations could not be reached due to water depth. The count was conducted in the vicinity of the permanent survey stations, and an additional one was done in the flooded shrubland. Five minutes were spent at each survey station recording all birds seen and heard, along with activity and habitat type. Large numbers of wetland birds were documented throughout Drew, including flocks of ducks and shorebirds in the flooded shrubland. In fact, this years' count shows a significant increase in total number of birds, number of species, and number of Habitat Indicator Species as compared to baseline counts conducted in 2002 and 2004 during the same time of year. A total of 35 avian species were present, 17 of which were Habitat Indicator Species for BWMA. The most abundant species was mallard. Up to 310 were seen scattered throughout the flooded grasslands. Small flocks of American Wigeon were seen in the tules and flooded shrubland. Herons, egrets and White-faced Ibis were foraging in the wet meadows. A total of 40 Sora were heard calling among the tules. Red-winged Blackbirds were constantly in motion flying overhead, while Yellow-headed Blackbirds were calling from the tules and flooded shrubland. American Avocets and Greater and Lesser Yellowlegs were seen foraging in the flooded grasslands and shrublands. Large numbers of Savannah Sparrows were detected along the edges of the flooded grassland. Five Wilson's Snipes were observed in the flooded grassland. The following table and charts illustrate the significant increase in this year's count compared to two previous baseline surveys that were also conducted in late August.

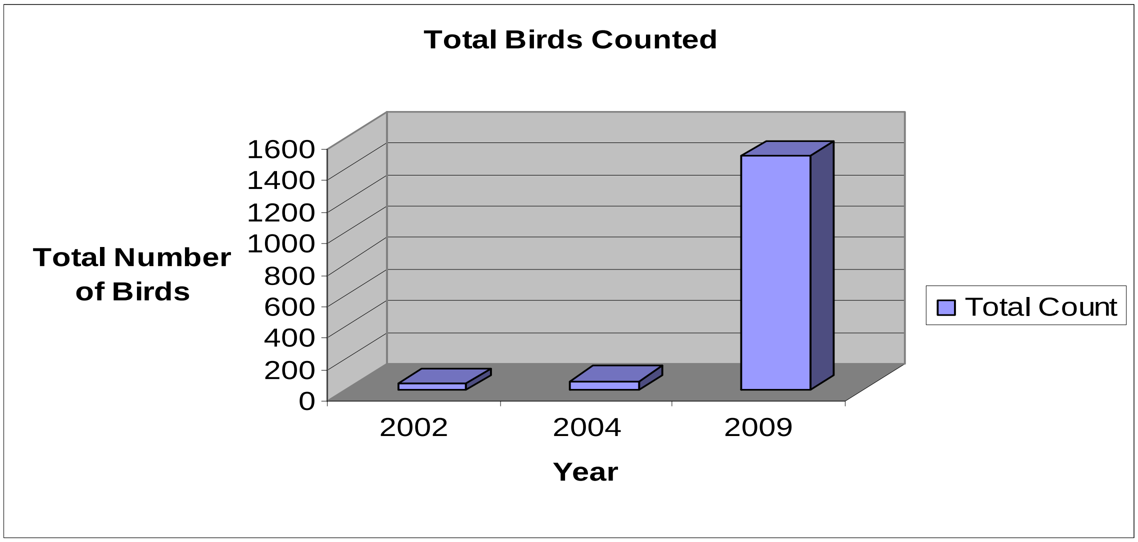
DREW UNIT BIRD DATA	DATE		
COMMON NAME	**8/18/2002**	**8/30/2004**	**8/27/2009**
*Gadwall			96
*American Wigeon			205
*Mallard			310
California Quail		1	
*Least Bittern			1
*Great Blue Heron			2
*Great Egret			19
*White-faced Ibis			167
*Northern Harrier		2	6
Red-shouldered Hawk		1	
Swainson's Hawk			1
American Kestrel			1
Peregrine Falcon			1
*Virginia Rail			1
*Sora			40
*American Coot			118
*Killdeer			12
*American Avocet			3
*Greater Yellowlegs			87
*Lesser Yellowlegs			15
*Wilson's Snipe			5
Mourning Dove		2	2
Belted Kingfisher		1	
Black Phoebe			5
Western Kingbird		2	
Eastern Kingbird		1	
Loggerhead Shrike	3		2
Black-billed Magpie	1		
Common Raven	1	2	2
Horned Lark	8		
Bank Swallow			78
Cliff Swallow		1	
Barn Swallow			44
Bewick's Wren	1	2	1
*Marsh Wren		1	10
Northern Mockingbird		1	
Sage Thrasher	1	1	
Le Conte's Thrasher		4	
European Starling	9		
Orange-crowned Warbler		1	
Yellow Warbler			4

COMMON NAME	8/18/2002	8/30/2004	8/27/2009
Common Yellowthroat	7	3	2
Spotted Towhee		1	
Brewer's Sparrow	5	11	
Black-throated Sparrow	2		
Sage Sparrow		1	
Savannah Sparrow	1	3	76
Song Sparrow		1	2
Black-headed Grosbeak	1		
Red-winged Blackbird	1	11	111
Western Meadowlark	1	4	1
Yellow-headed Blackbird			52
Great-tailed Grackle			4
Lesser Goldfinch		3	
Total	42	61	1486

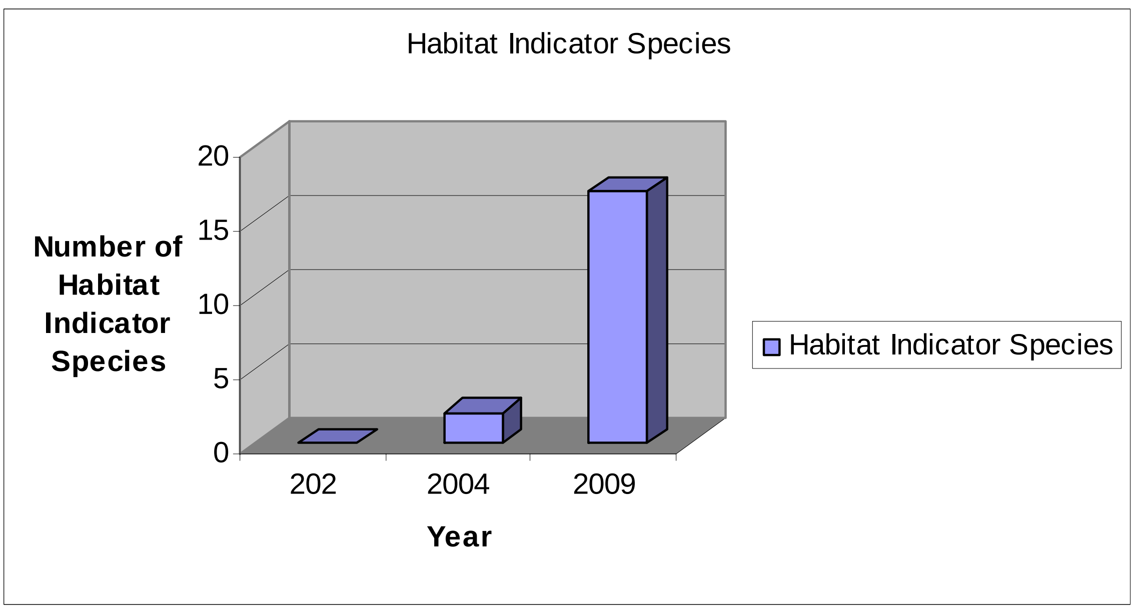
**habitat indicator species*



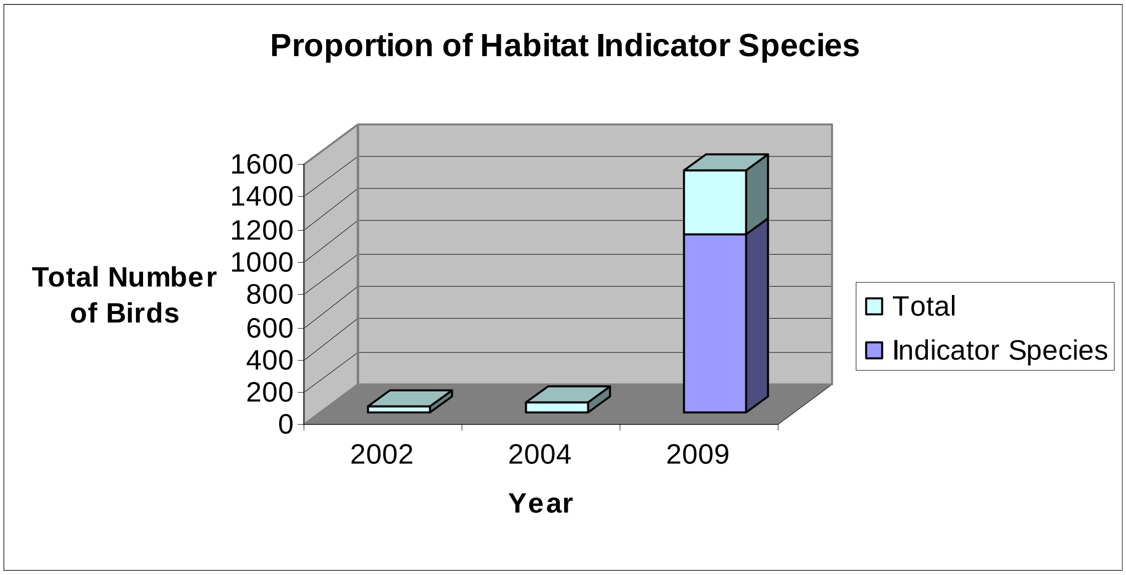
There were more species in 2009 at Drew than preproject.



There was a significant increase in the number of birds detected in 2009 over preproject conditions.



There also was a significant increase in the number of Habitat Indicator Species in 2009.



Most of the birds counted at Drew in 2009 were Habitat Indicator Species.

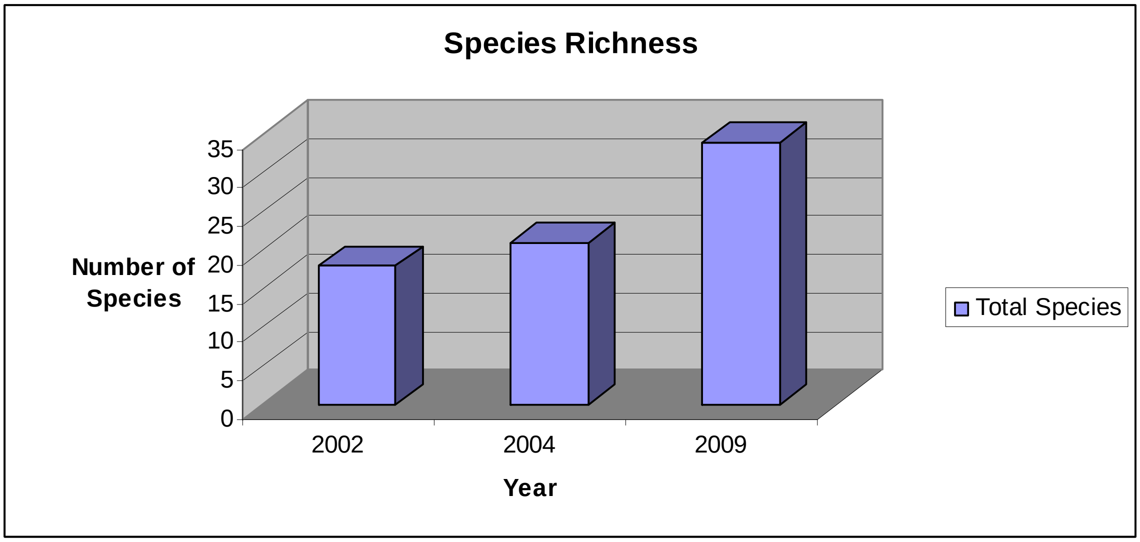
Waggoner Unit

Flooding in the Waggoner Unit did not extend beyond the existing flood basin during the count, but there were many open spaces in the tules where there were none last year. A total of 36 avian species were documented in the unit, 12 of which were Habitat Indicator Species for BWMA. Three of the Habitat Indicator Species counted were waterfowl, and no waterfowl were reported in the previous baseline count. This year there were 120 American Wigeon, 49 Cinnamon Teal, and 11 mallards. Red-winged Blackbird was the most abundant species as 283 were detected flying over or calling from the tules. 36 Yellow-headed Blackbirds were counted as well. A total of 114 Bank Swallows were seen flying over the Waggoner Unit. 110 American White Pelicans were seen soaring in spirals over the wetlands. There were large numbers of Marsh Wrens and Common Yellowthroats in Waggoner among the tules. Because of the adjacent woodlands, other species were seen in Waggoner adding to the species richness. Woodland species such as Black-billed Magpie, American Goldfinch, Yellow Warbler, American Kestrel, and Warbling Vireo were detected. During the previous counts at Waggoner, in 2002 and 2004, no waterfowl were found. During this one visit there were 180 ducks using the site. The burn earlier in the year improved habitat by creating open spaces in the tules for waterfowl. The following table and charts illustrate the significant increase in this year's count compared to two previous baseline surveys that were also conducted in late August.

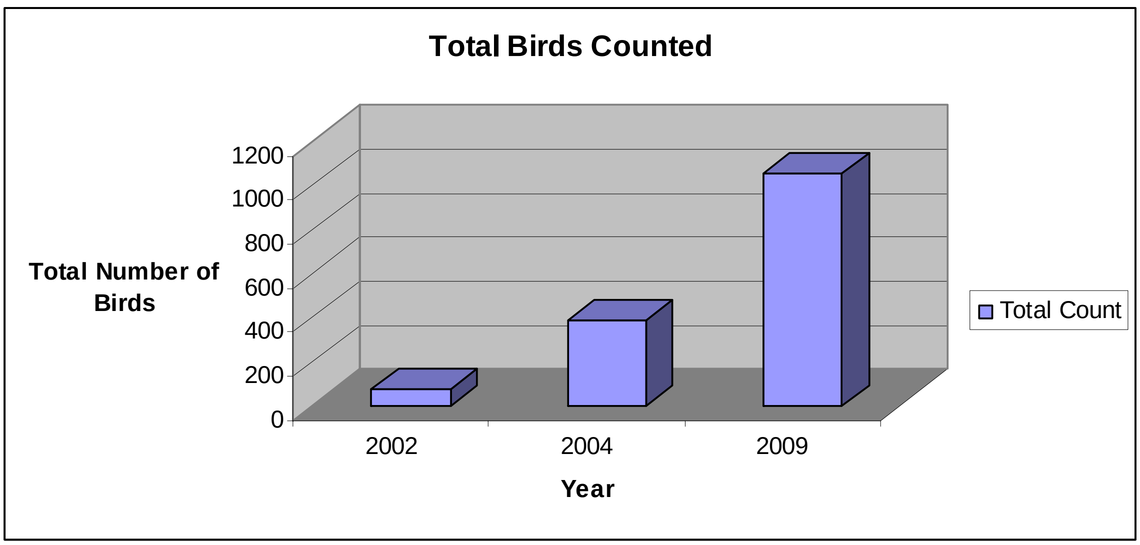
WAGGONER UNIT BIRD DATA	**DATE**		
COMMON NAME	**8/15/2002**	**8/30/2004**	**8/28/2009**
*American Wigeon			120
*Mallard			11
*Cinnamon Teal			49
Eared Grebe			1
American White Pelican	65	300	110
Double-crested Cormorant			1
*Great Blue Heron			9

COMMON NAME	8/15/2002	8/30/2004	8/28/2009
*Great Egret			16
*White-faced Ibis			19
*Osprey		2	
*Northern Harrier		1	5
Red-tailed Hawk			1
American Kestrel	1		2
*Sora			17
*American Coot			103
*Killdeer		6	
*Spotted Sandpiper		1	
*Greater Yellowlegs			15
*Least Sandpiper	3		
Caspian Tern		10	
Mourning Dove	1		
Greater Roadrunner	1		
Lesser Nighthawk		1	
Rufous Hummingbird		1	
Black Phoebe			9
Say's Phoebe	1	2	2
Western Kingbird	3		1
Loggerhead Shrike	1	1	
Warbling Vireo			2
Black-billed Magpie			10
Common Raven	3	6	1
Tree Swallow	1	2	
Violet-green Swallow	1		
Northern Rough-winged Swallow	1		
Bank Swallow		7	114
Barn Swallow			5
Unidentified Swallow	4		
Bewick's Wren		1	
*Marsh Wren	1	7	31
Northern Mockingbird	2		
European Starling		2	4
Yellow Warbler		1	3
Common Yellowthroat	3	16	30
Unidentified Warbler	1		
Brewer's Sparrow		3	
Savannah Sparrow			4
Song Sparrow		1	1
Western Tanager			1
Red-winged Blackbird	1	10	283
Yellow-headed Blackbird			66
Great-tailed Grackle			1
American Goldfinch			7
Total	69	381	1054

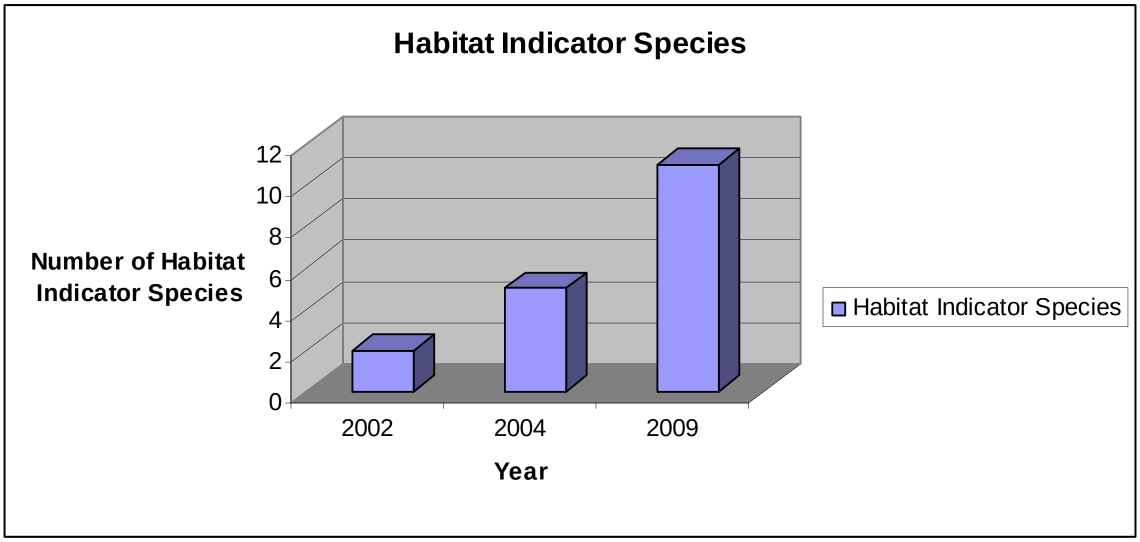
**habitat indicator species*



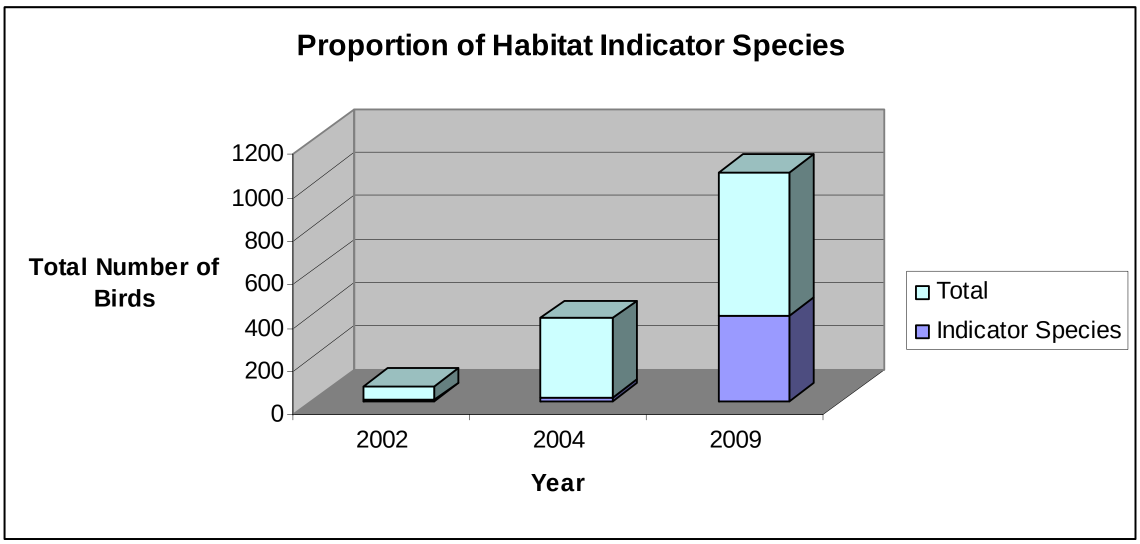
There were more species in 2009 at Waggoner than preproject.



There was a significant increase in the number of birds detected in 2009 over preproject conditions.



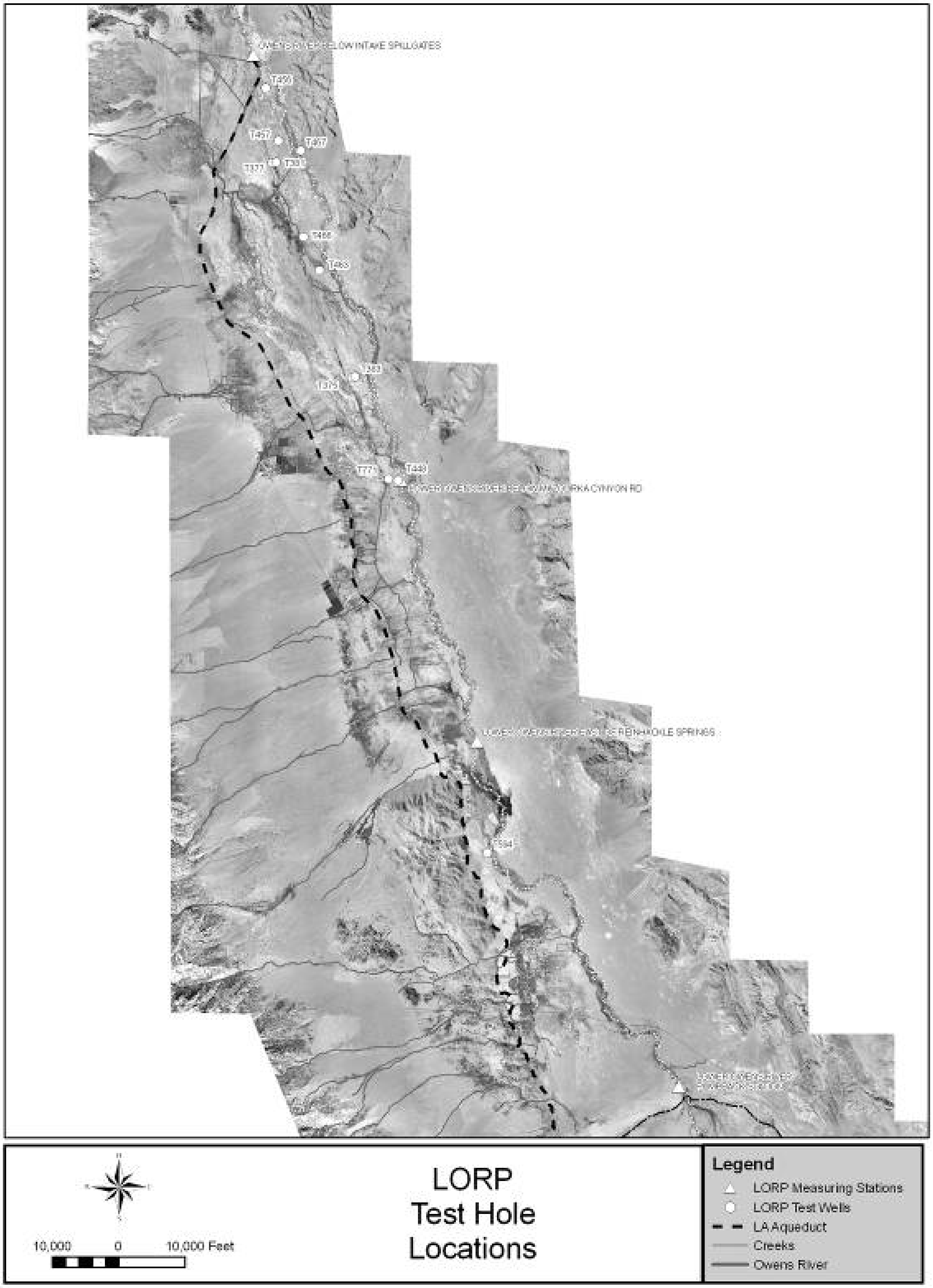
There also was a significant increase in the number of Habitat Indicator Species in 2009.



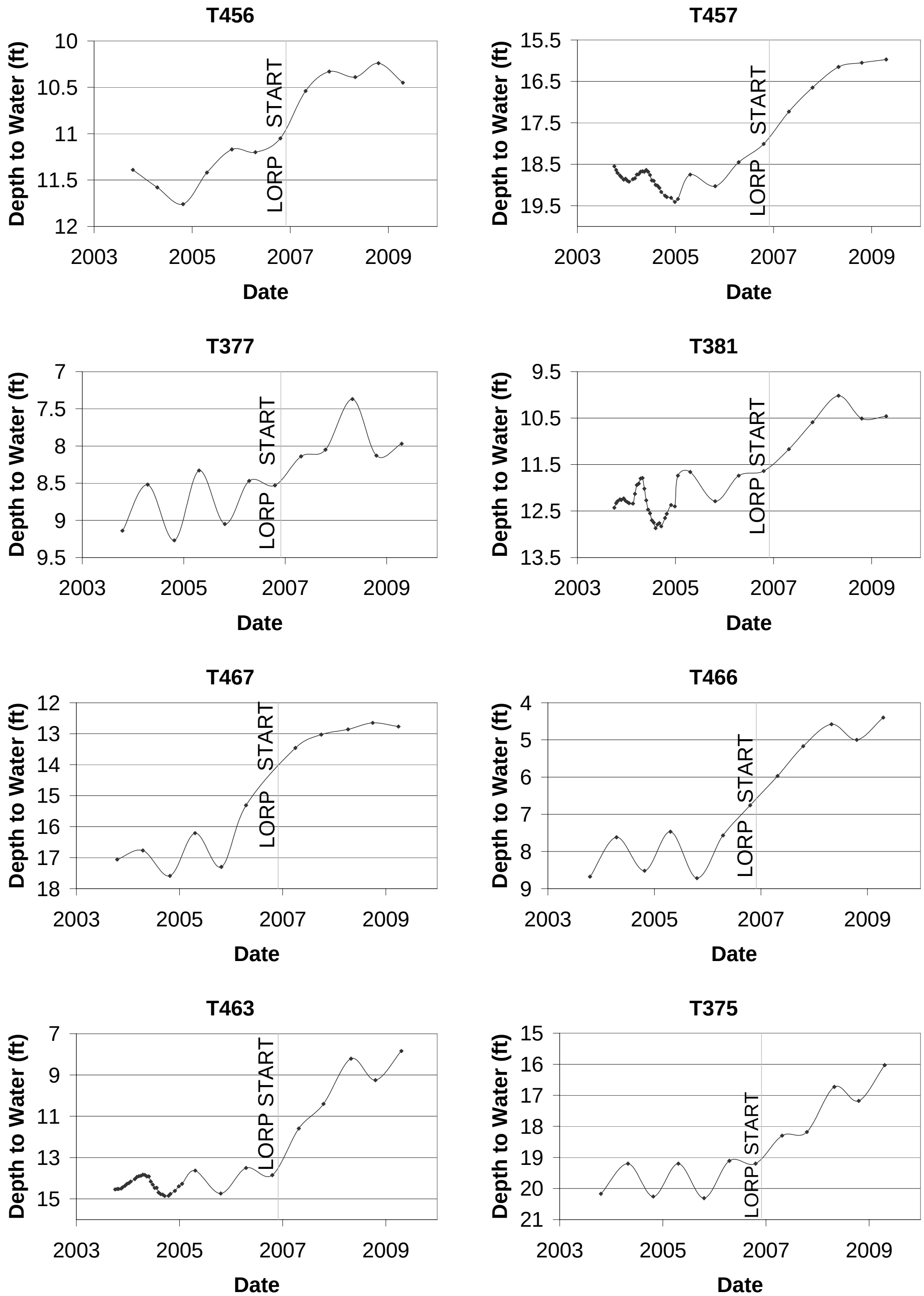
A significant proportion of the birds counted at Waggoner in 2009 were Habitat Indicator Species.

5.6. Groundwater Effects of the LORP

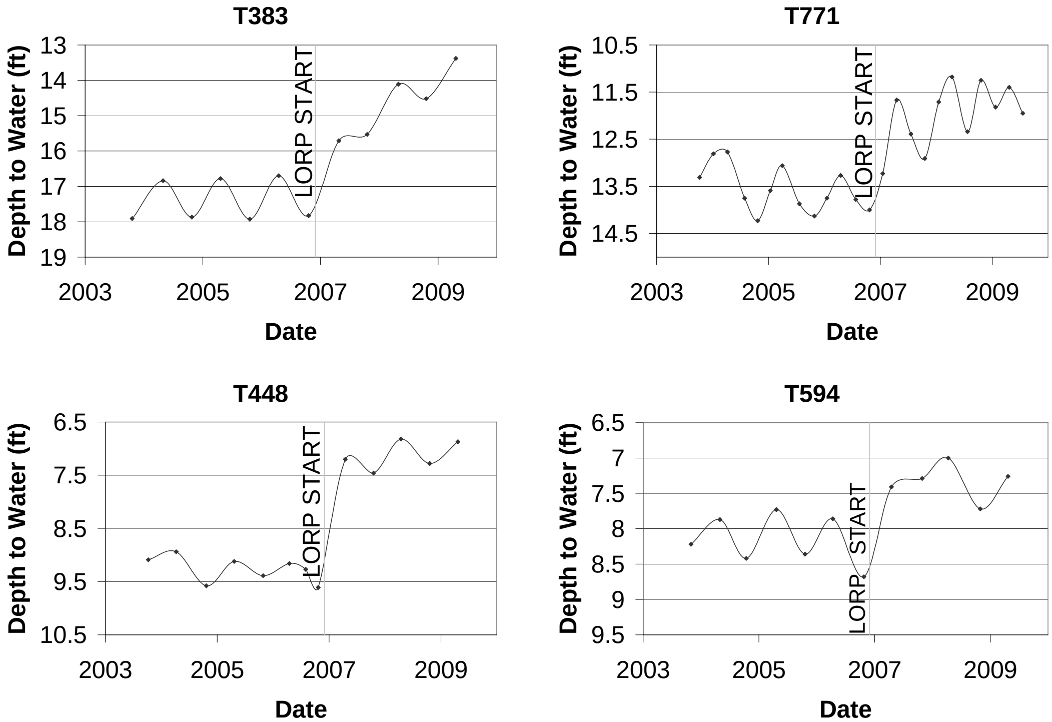
12 test holes were selected to analyze the response of the LORP flows to the groundwater levels in the vicinity of the LORP (Hydrologic Monitoring Figure 5). On average, the groundwater levels of the selected test holes increased by 2.3 feet from the beginning of the LORP flows (December 2006) until now. Some of the test holes experienced a rise in the water table soon after the LORP flows were initiated while others have shown a slower and steadier rise (Hydrologic Monitoring Figure 6).



Hydrologic Monitoring Figure 5. Selected Test Hole Locations Near the LORP

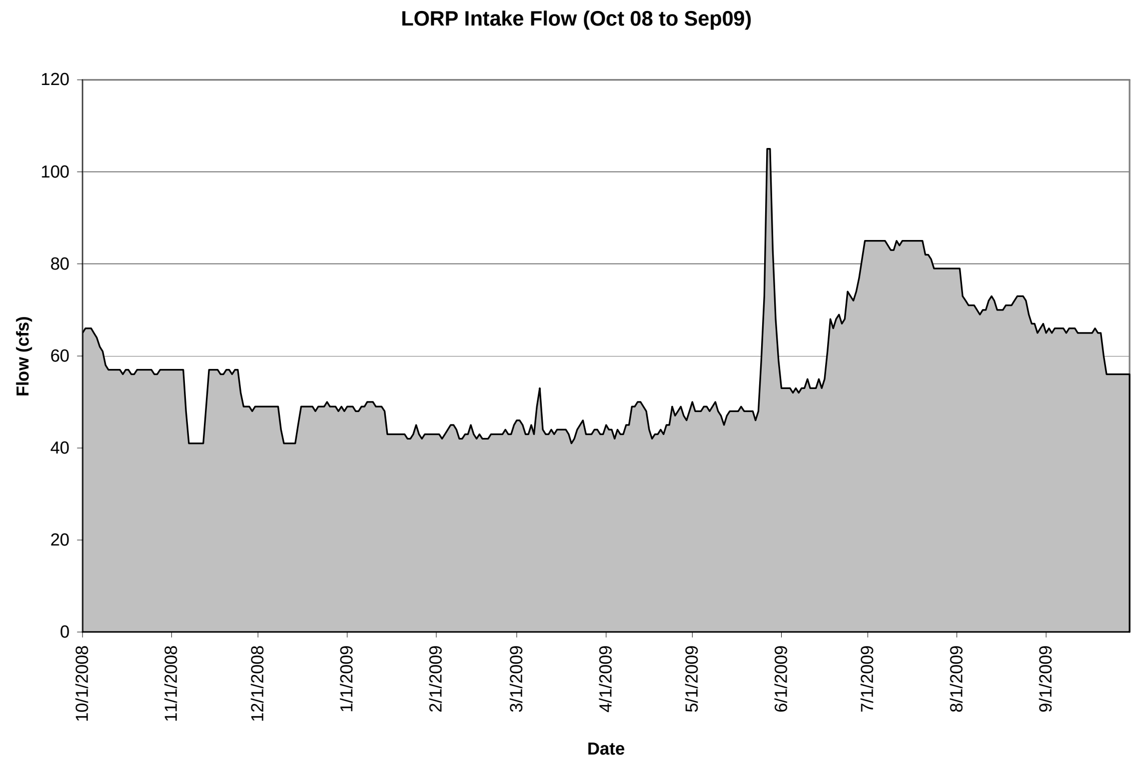


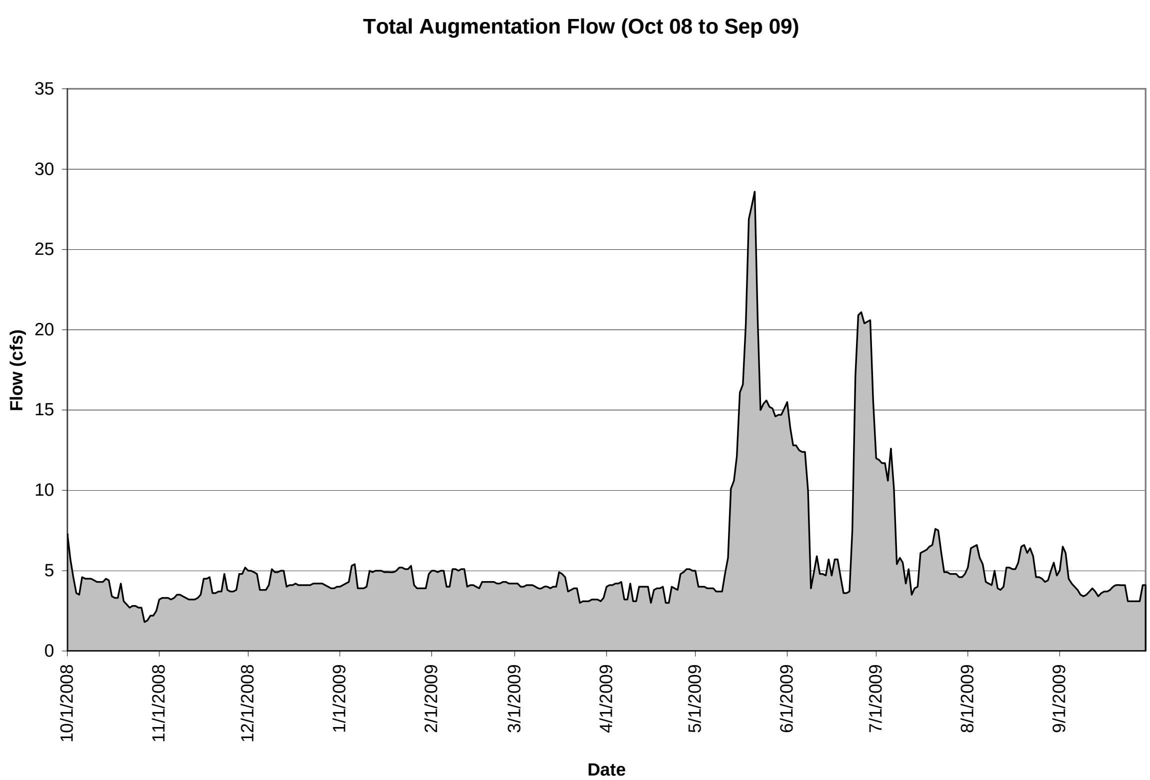
Hydrologic Monitoring Figure 6. Selected Test Hole Depth to Water from Well Reference Point
(continued on next page)

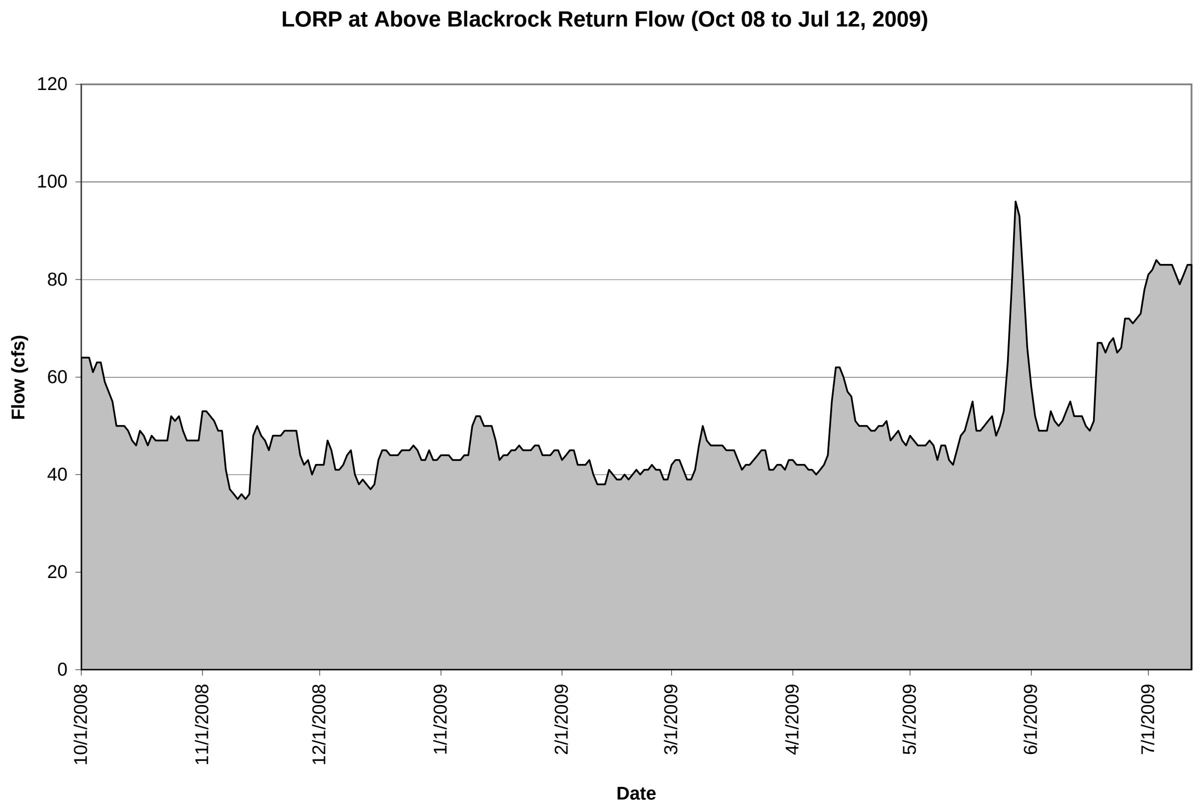


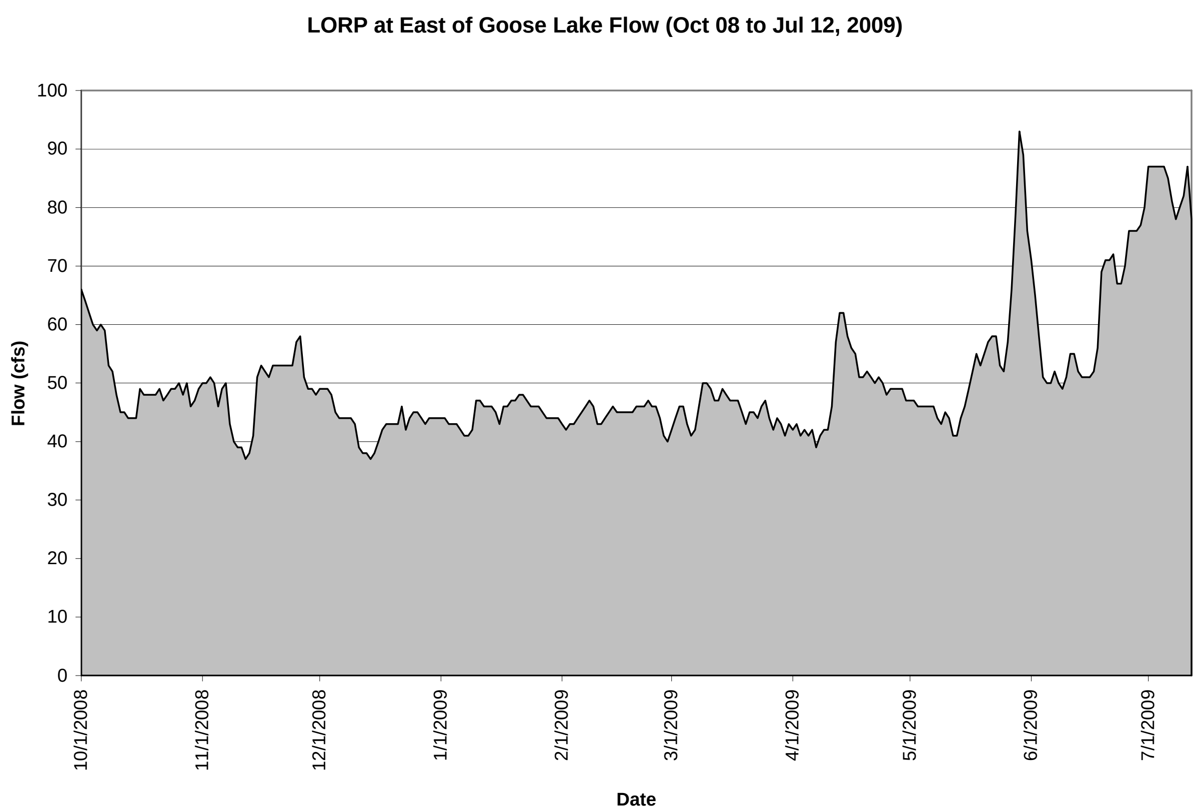
Hydrologic Monitoring Figure 6, continued.
Selected Test Hole Depth to Water from Well Reference Point

5.7. Appendix 1. Additional Hydrologic Monitoring Graphs

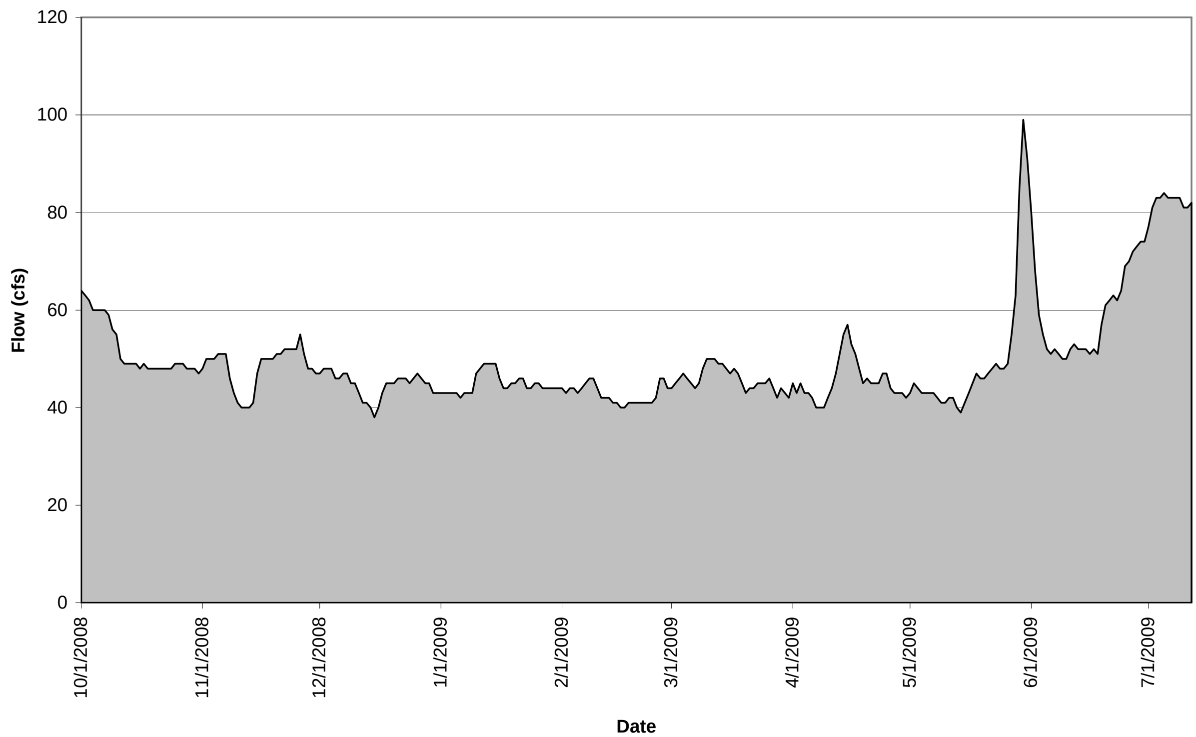




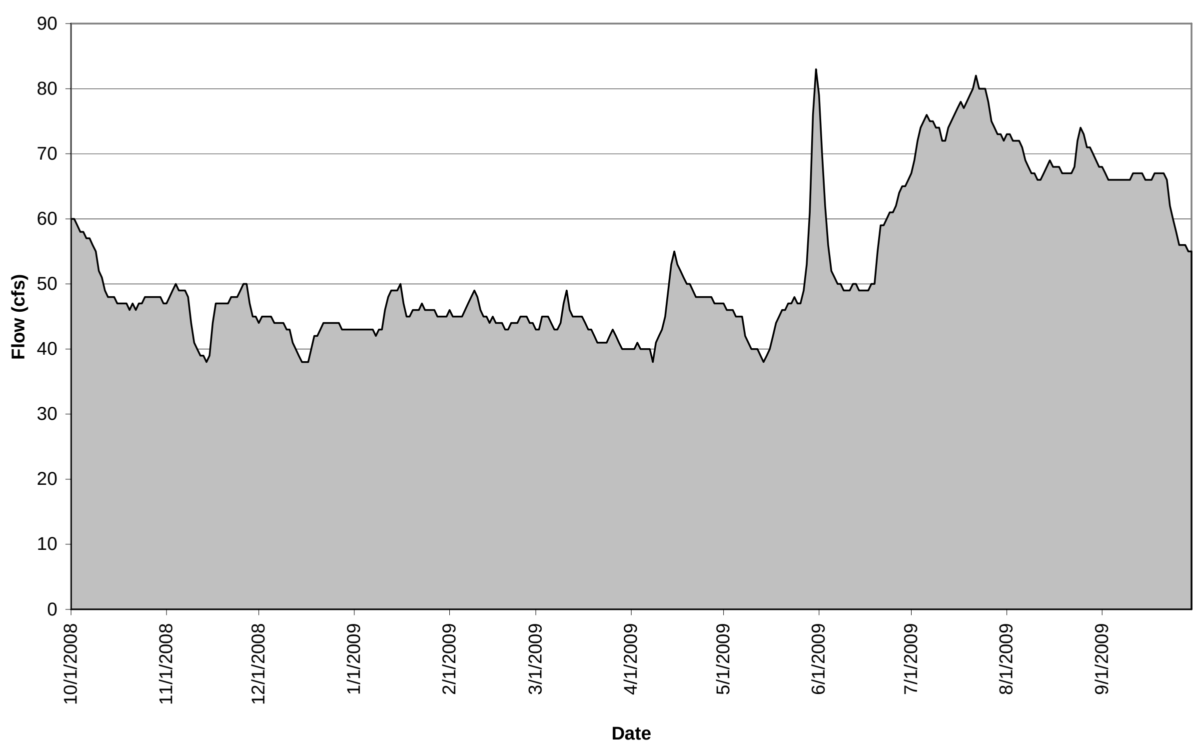

LORP at Above Blackrock Return Flow (Oct 08 to Jul 12, 2009)
Flow (cfs)
0
20
40
60
80
100
120
10/1/2008
11/1/2008
12/1/2008
1/1/2009
2/1/2009
3/1/2009
4/1/2009
5/1/2009
6/1/2009
7/1/2009
Date

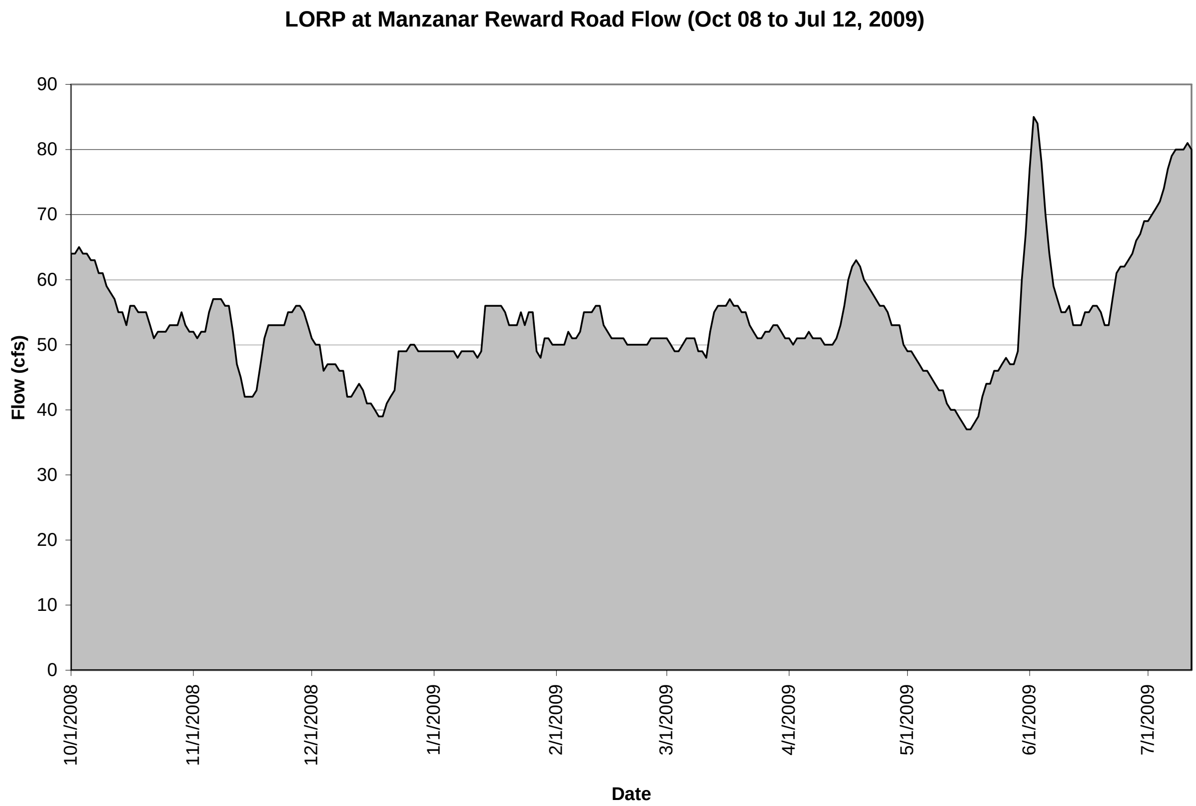

LORP at East of Goose Lake Flow (Oct 08 to Jul 12, 2009)
Flow (cfs)
0
10
20
30
40
50
60
70
80
90
100
10/1/2008
11/1/2008
12/1/2008
1/1/2009
2/1/2009
3/1/2009
4/1/2009
5/1/2009
6/1/2009
7/1/2009
Date

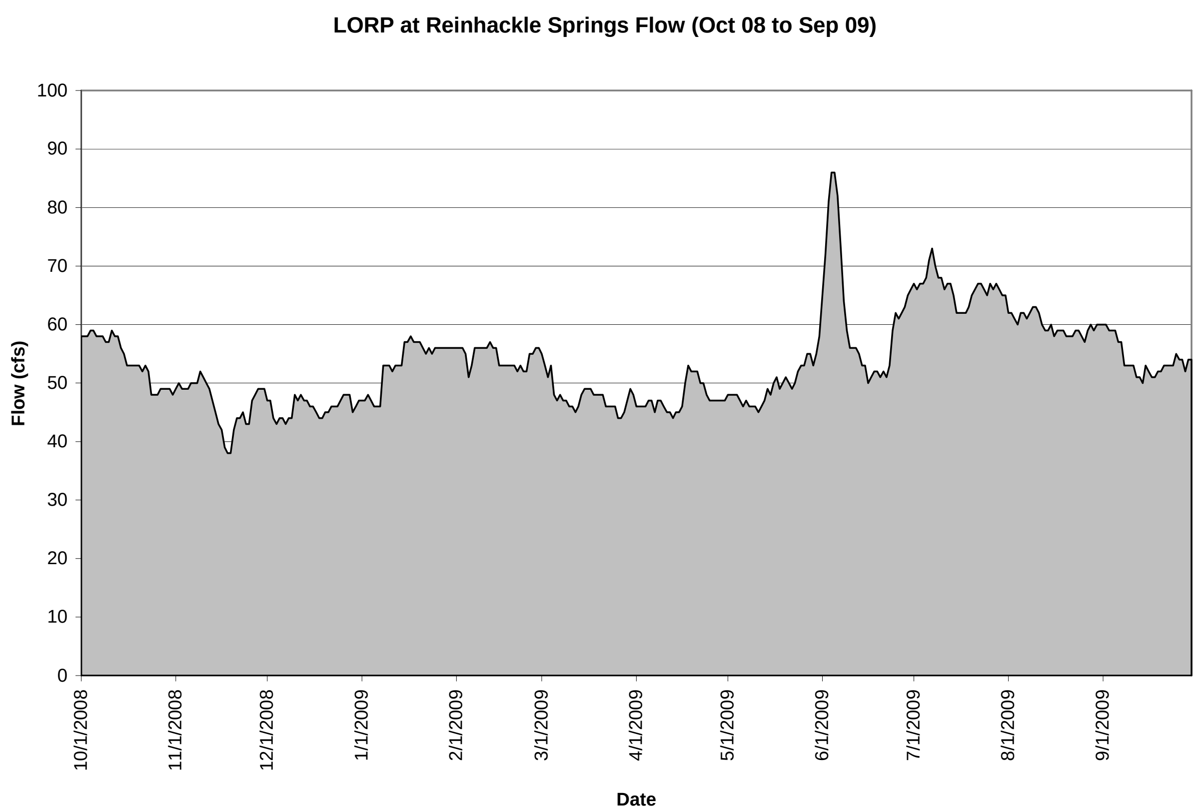
LORP at Two Culverts Flow (Oct 08 to Jul 12, 2009)

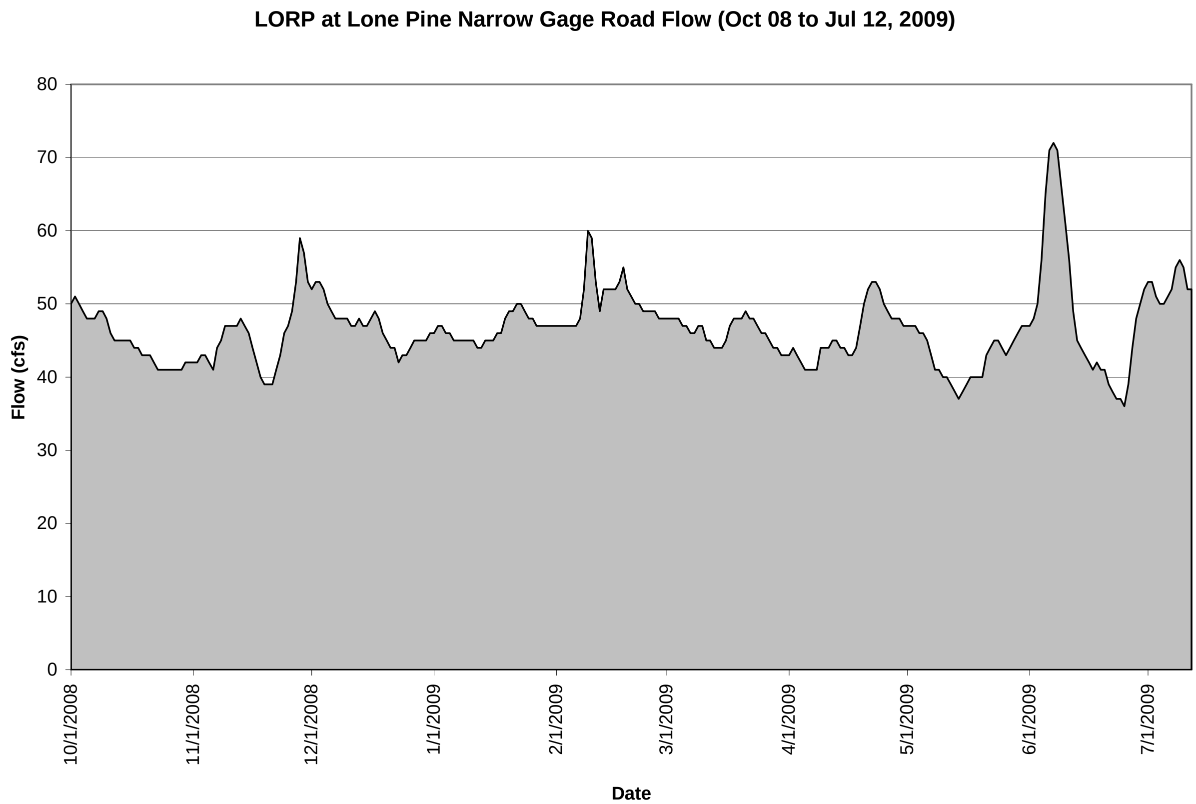


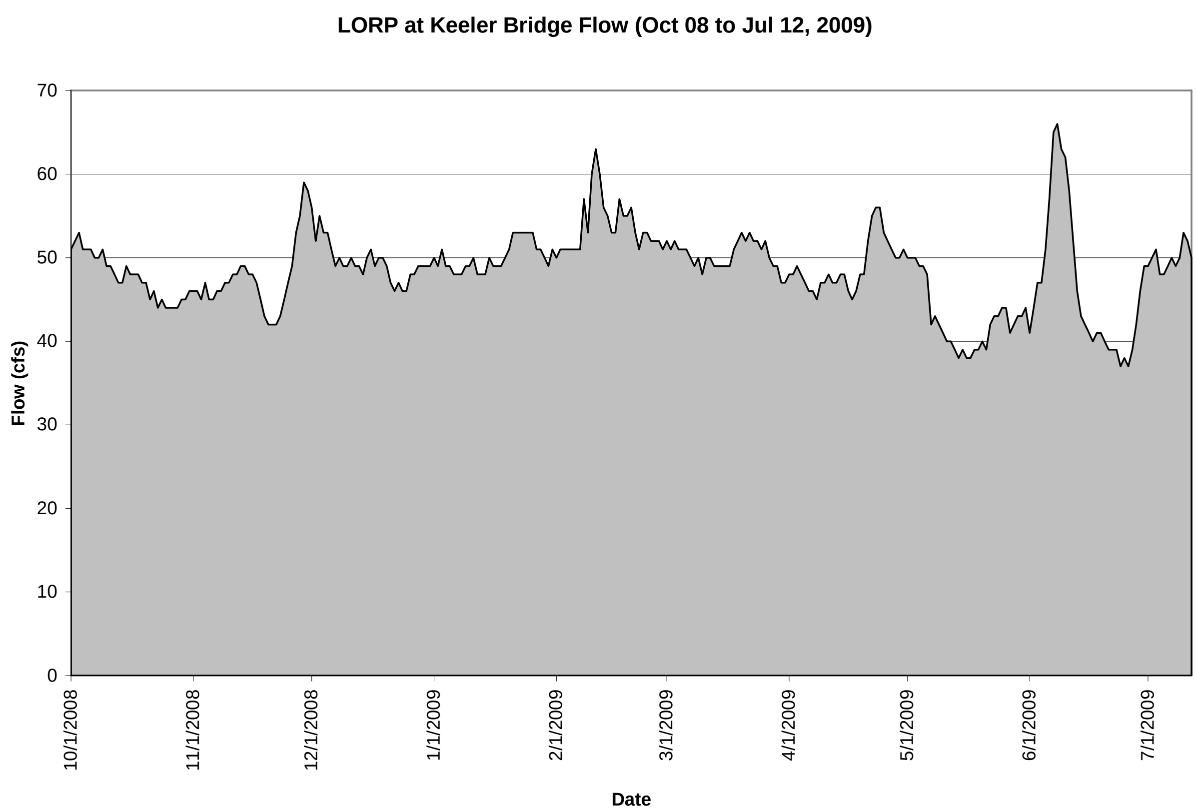
LORP at Mazourka Canyon Road Flow (Oct 08 to Sep 09)

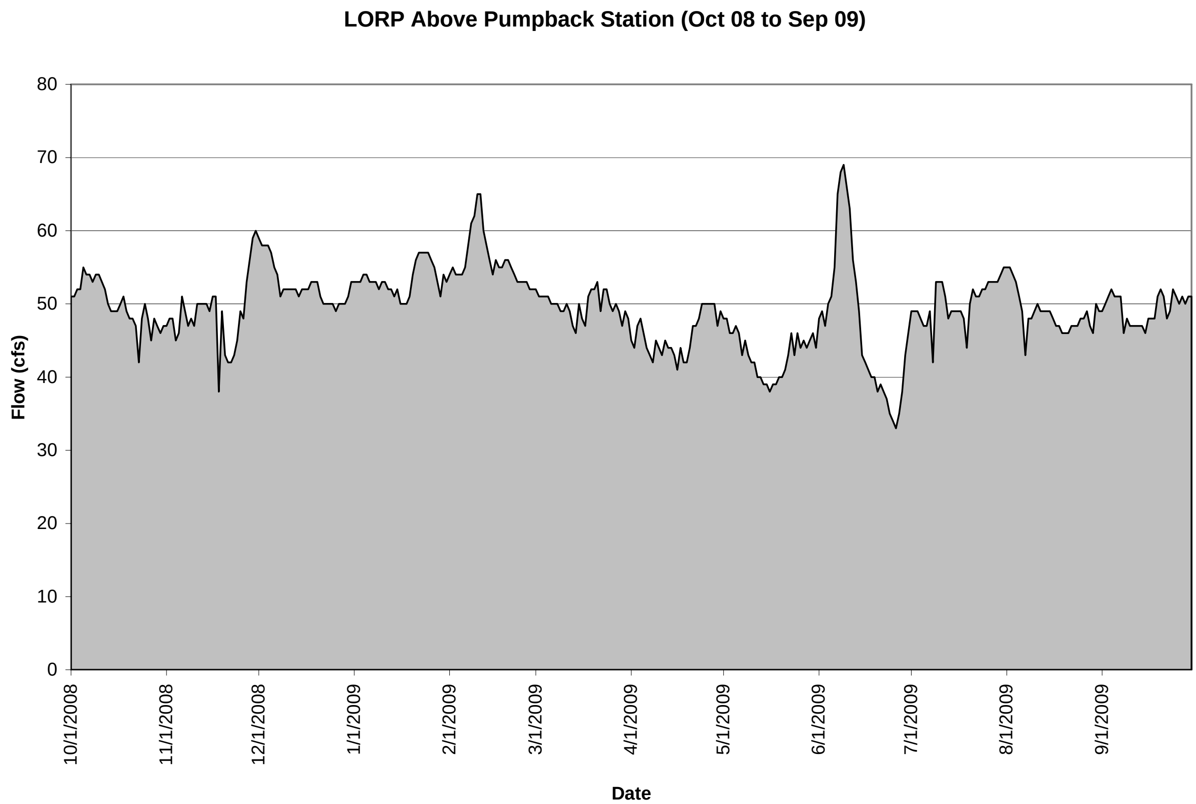


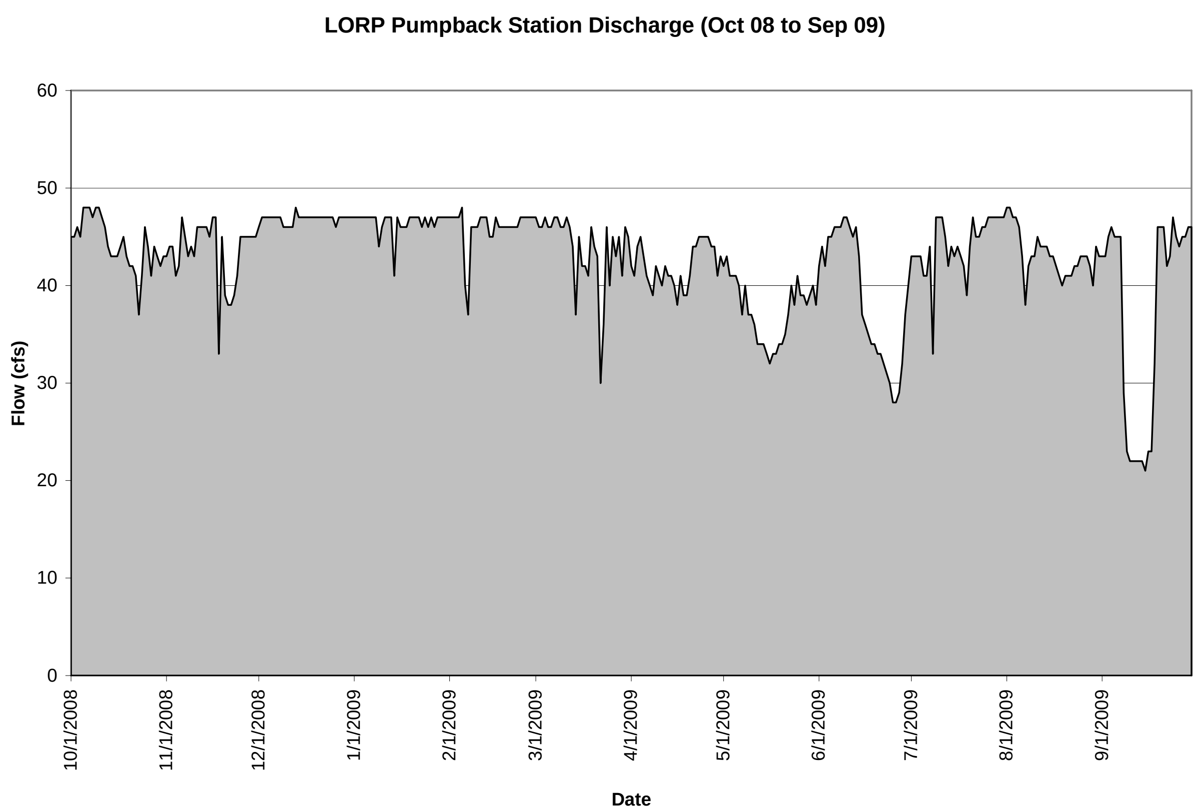

LORP at Manzanar Reward Road Flow (Oct 08 to Jul 12, 2009)
Flow (cfs)
0
10
20
30
40
50
60
70
80
90
10/1/2008
11/1/2008
12/1/2008
1/1/2009
2/1/2009
3/1/2009
4/1/2009
5/1/2009
6/1/2009
7/1/2009
Date

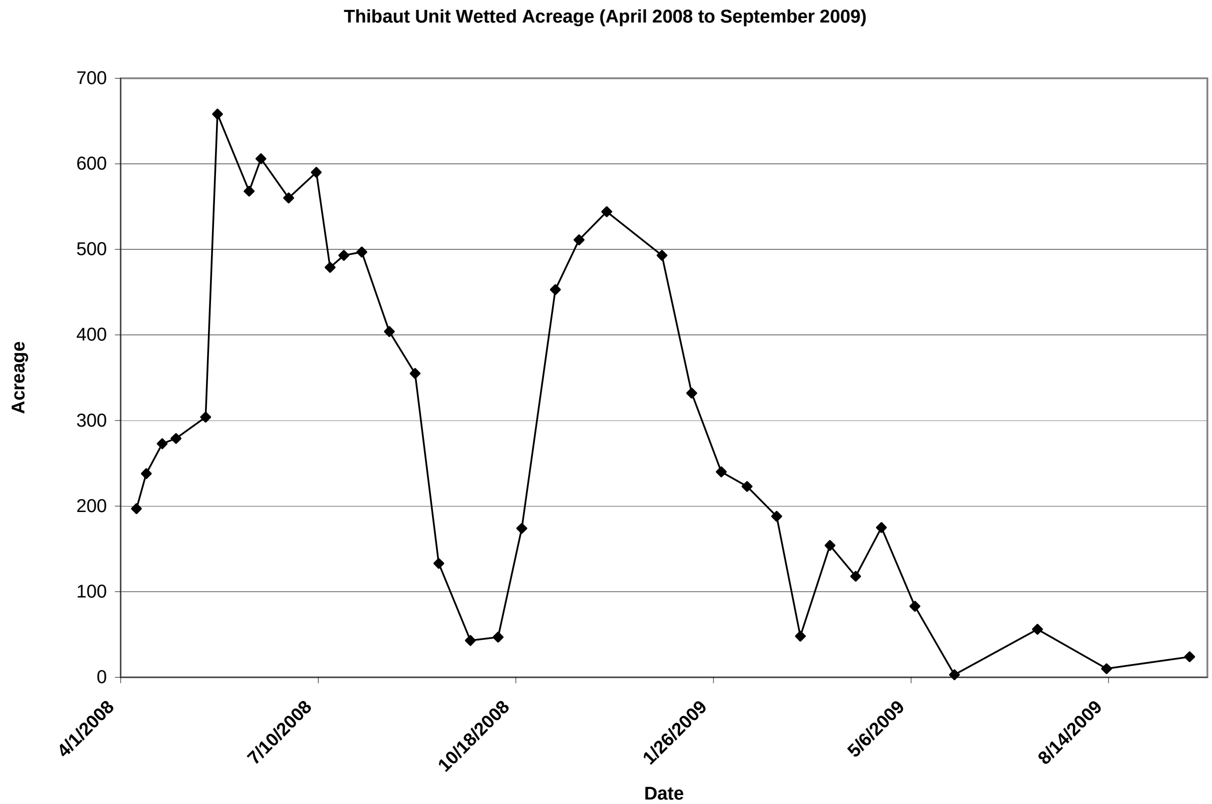

LORP at Reinhackle Springs Flow (Oct 08 to Sep 09)
Flow (cfs)
0
10
20
30
40
50
60
70
80
90
100
10/1/2008
11/1/2008
12/1/2008
1/1/2009
2/1/2009
3/1/2009
4/1/2009
5/1/2009
6/1/2009
7/1/2009
8/1/2009
9/1/2009
Date

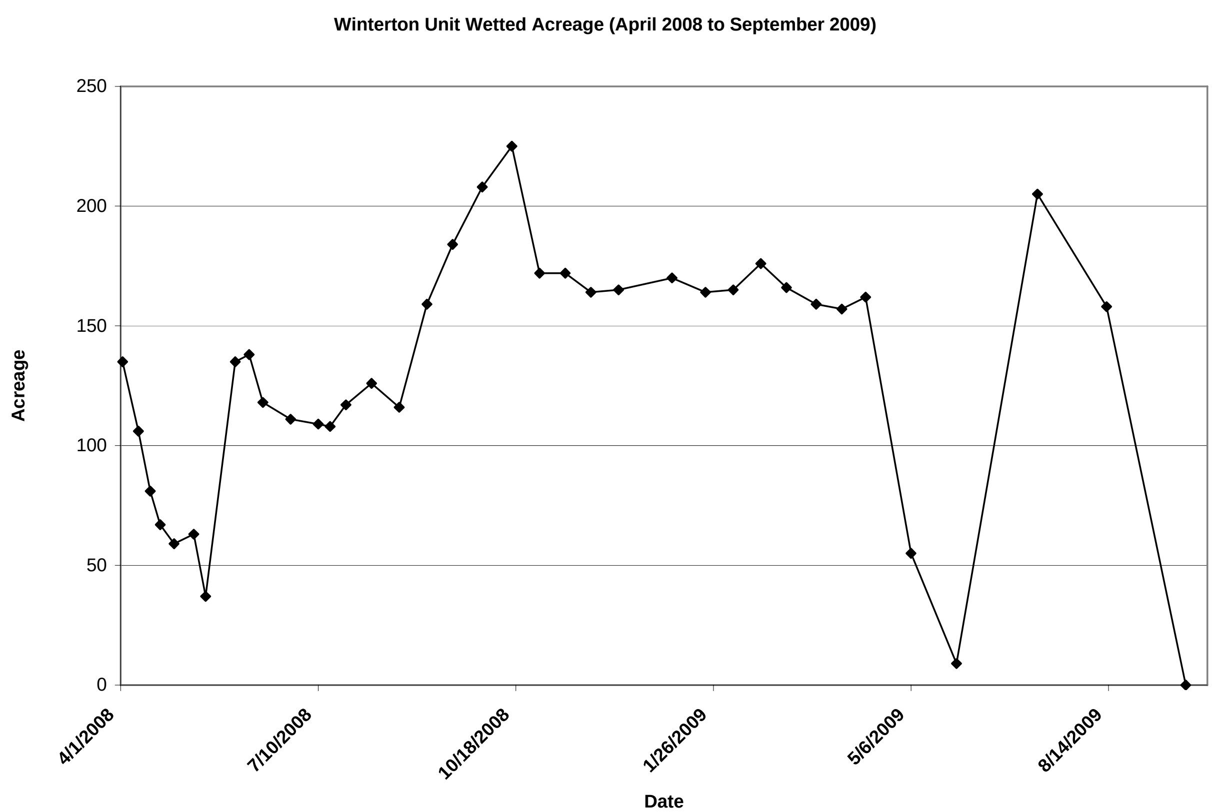

LORP at Lone Pine Narrow Gage Road Flow (Oct 08 to Jul 12, 2009)
Flow (cfs)
0
10
20
30
40
50
60
70
80
10/1/2008
11/1/2008
12/1/2008
1/1/2009
2/1/2009
3/1/2009
4/1/2009
5/1/2009
6/1/2009
7/1/2009
Date

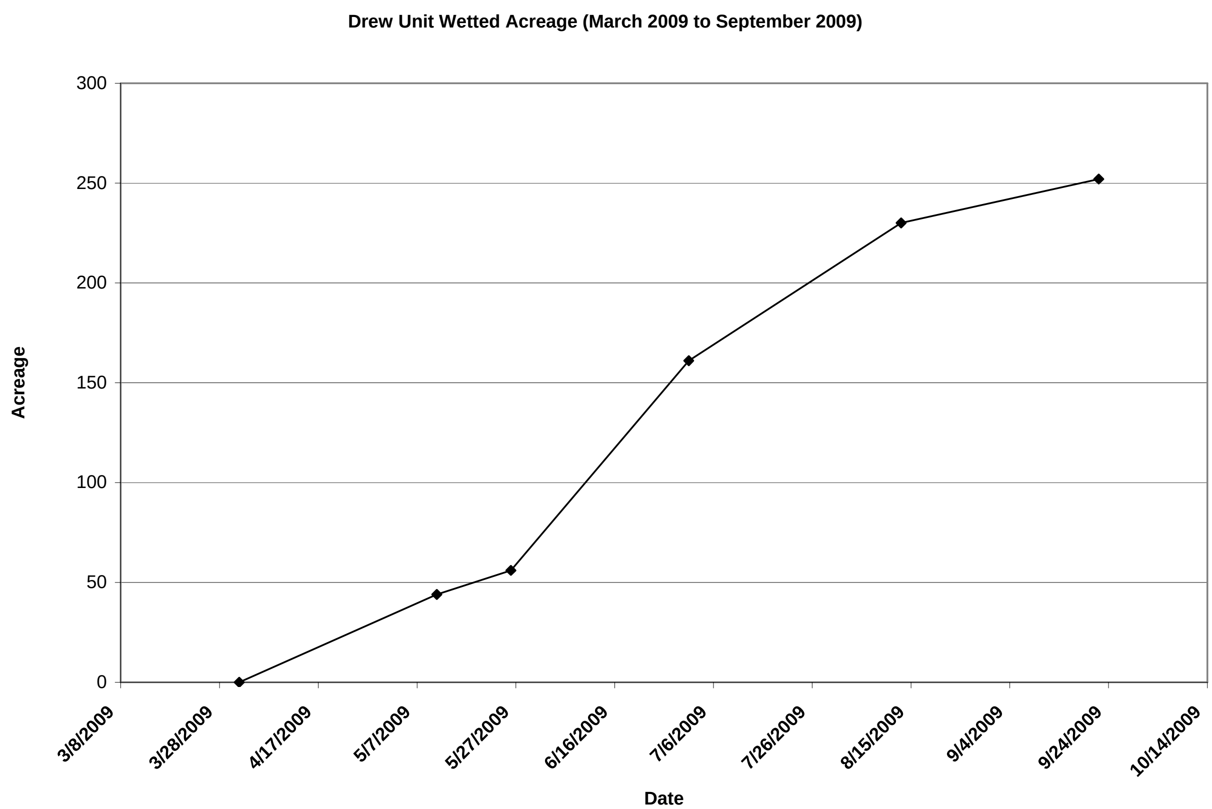

LORP at Keeler Bridge Flow (Oct 08 to Jul 12, 2009)
Flow (cfs)
0
10
20
30
40
50
60
70
10/1/2008
11/1/2008
12/1/2008
1/1/2009
2/1/2009
3/1/2009
4/1/2009
5/1/2009
6/1/2009
7/1/2009
Date

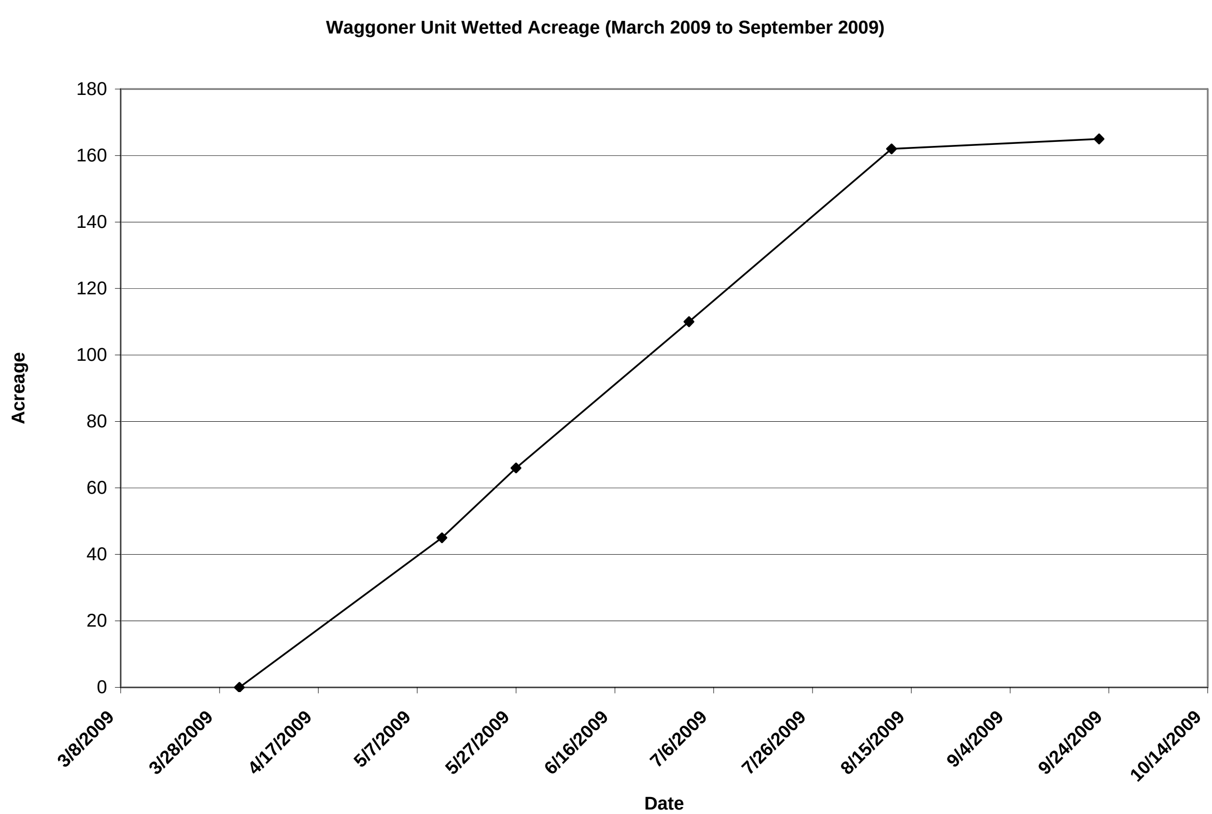

LORP Above Pumpback Station (Oct 08 to Sep 09)
Flow (cfs)
0
10
20
30
40
50
60
70
80
10/1/2008
11/1/2008
12/1/2008
1/1/2009
2/1/2009
3/1/2009
4/1/2009
5/1/2009
6/1/2009
7/1/2009
8/1/2009
9/1/2009
Date


LORP Pumpback Station Discharge (Oct 08 to Sep 09)
Flow (cfs)
0
10
20
30
40
50
60
10/1/2008
11/1/2008
12/1/2008
1/1/2009
2/1/2009
3/1/2009
4/1/2009
5/1/2009
6/1/2009
7/1/2009
8/1/2009
9/1/2009
Date


Thibaut Unit Wetted Acreage (April 2008 to September 2009)
Acreage
700
600
500
400
300
200
100
0
4/1/2008
7/10/2008
10/18/2008
1/26/2009
5/6/2009
8/14/2009
Date


Winterton Unit Wetted Acreage (April 2008 to September 2009)
Acreage
250
200
150
100
50
0
4/1/2008
7/10/2008
10/18/2008
1/26/2009
5/6/2009
8/14/2009
Date


Drew Unit Wetted Acreage (March 2009 to September 2009)
Acreage
300
250
200
150
100
50
0
3/8/2009
3/28/2009
4/17/2009
5/7/2009
5/27/2009
6/16/2009
7/6/2009
7/26/2009
8/15/2009
9/4/2009
9/24/2009
10/14/2009
Date


Waggoner Unit Wetted Acreage (March 2009 to September 2009)
Acreage
180
160
140
120
100
80
60
40
20
0
3/8/2009
3/28/2009
4/17/2009
5/7/2009
5/27/2009
6/16/2009
7/6/2009
7/26/2009
8/15/2009
9/4/2009
9/24/2009
10/14/2009
Date

6.0 LAND MANAGEMENT

6.1. Introduction

The land use component of the LORP is composed of project elements related to livestock grazing management. Under the land management program, the intensity, location, and duration of grazing is managed through the establishment of riparian pastures, forage utilization rates, and prescribed grazing periods (described in Section 2.8.1.3 and 2.8.2 LORP EIR 2004). Other actions include protection of rare plant populations, establishment of off-river watering sources (to reduce use of the river and off-river ponds for livestock watering) and the monitoring of utilization and rangeland trend throughout the leases to ensure that grazing rates maintain the long-term productivity.

Grazing Management Plans developed for the LORP leases modified grazing practices in riparian and upland areas on seven LADWP leases in order to support LORP goals. The seven leases within the LORP planning area are: Intake, Twin Lakes, Blackrock, Thibaut, Islands, Lone Pine, and Delta. LORP-related land use activities and monitoring that took place in 2009 are presented by lease, in Section 6.7, Land Use Results.

6.2. Utilization

The *Owens Valley Land Management Plan* developed as part of the LORP identifies grazing utilization standards for upland and riparian areas. Utilization is defined as the percentage of the current year's herbage production consumed or destroyed by herbivores. Grazing utilization standards identify the maximum amount of biomass that can be removed by grazing animals during specified grazing periods. LADWP has developed height-weight relationship curves for native grass and grass-like forage species in the Owens Valley using locally-collected plants. These height-weight curves are used to relate the percent of plant height removed with the percent of biomass removed by grazing animals. Land managers can use this data to document the percent of biomass removed by grazing animals and determine whether or not grazing utilization standards are being exceeded. Utilization data collected on a seasonal basis (mid- and end-points of a grazing period) will determine compliance with grazing utilization standards, while long-term utilization data will aid in the interpretation of range trend data and will help guide future grazing management decisions.

The calculation of utilization (by transect and pasture) is based on a weighted average. Therefore, species that only comprise a small part of available forage contribute proportionally less to the overall use value than more abundant species.

6.2.1. Riparian Utilization Rates and Grazing Periods

Under the LORP, livestock are allowed to graze in riparian pastures during the grazing periods prescribed for each lease (see Sections 2.8.2.1 through 2.8.2.7 LORP EIR 2004). Livestock are to be removed from riparian pastures when the utilization rate reaches 40% or at the end of the grazing period, whichever comes first. The beginning and ending dates of the lease-specific grazing periods may vary from year-to-year depending on the conditions such as climate and weather, but the duration remains approximately the same. The grazing periods and utilization rates are designed to facilitate the recruitment and establishment of riparian shrubs and trees.

6.2.2. Upland Utilization Rates and Grazing Periods

In upland pastures, the maximum utilization allowed on herbaceous vegetation, in any grazing season will be 65%. Once 65% is reached all pastures must receive 60 continuous days of rest for the area during the plant "active growth stage" to allow seed set between June and September. The utilization rates and grazing periods for upland pastures are designed to sustain livestock grazing and productive wildlife through efficient use of forage. Riparian pastures may also contain upland habitat. If significant amounts of upland vegetation occur within a riparian pasture or field, upland grazing utilization standards will also apply to these upland habitat types. Livestock will be removed from a riparian pasture when either the riparian or the upland grazing utilization standards are met. Typically riparian utilization rate of 40% is reached before 65% use in the uplands occurs. Because of this pattern, utilization is not quantitavely sampled in adjacent upland areas, but use is assessed based on professional judgement. If utilization appears greater than 50% then utilization estimates using height weight curves will be implemented on the upland areas in the riparian field.

Monitoring methodologies are fully described in Section 4.6.2 of the *Lower Owens River Monitoring Adaptive Management and Reporting Plan* (Ecosystem Sciences, 2008).

Utilization monitoring is conducted annually. Permanent utilization transects have been established in upland and riparian areas of pastures within the LORP planning area. An emphasis has been placed on establishing utilization monitoring sites within riparian management areas. Each monitoring site is visited prior to any grazing in order to collect ungrazed plant heights for the season. Sites are visited again approximately mid-way through the grazing period (mid-season) and again at the conclusion of the grazing period (end-of-season).

Utilization estimates are conducted on all range trend transects if there is an adequate amount of the key forage species (Alkali sacaton, saltgrass, etc…). Some range trend sites have been burned or are found in the previous dry reach section of the Owens River and are absent of perennial grasses, therefore no utilization data is available. There are additional utilization transects not associated with range trend sites. These are called spatial utilization transects and will be read annually as long as they represent typical use in a pasture. If not (e.g. fire, flooding, change in grazing patterns) they will be temporarily or permanently abandoned.

Lessees have been given up to three years to phase in the requirements described above. At the beginning of 2010, the lessee must meet all standards, criteria, and other management directions outlined in their grazing plan. Watershed Resources staff will update each lessee with their mid-season and end-of-season utilization results for each year. During that time the lessee will also be provided with next years target utilization stubble heights for riparian and upland management areas. This will allow LADWP and the lessees to communicate and make grazing management changes as needed in order to meet LORP goals.

To allow compliance with the set utilization standards target stubble heights have been calculated for each transect and pasture on a given lease and distributed to each lessee. To calculate target stubble heights, ungrazed plant heights are collected after the end of the growing season to allow the plants to reach maximum production before the grazing season begins. The ungrazed heights are then averaged by species and transect in order to calculate the stubble heights that will meet the utilization standards for each field. The resulting calculated stubble heights are based on the same height/weight curves used in the mid- and end-of-season utilization calculations. The target stubble height information is provided to the lessees so that they may monitor utilization on their lease throughout the grazing season.

All of the end-of-season utilization data and the target stubble heights are presented below in the following range trend section in a table format for each lease.

6.3. Range Trend

6.3.1. Overview of Monitoring and Assessment Program

Monitoring was conducted at all irrigated pastures and at key areas within riparian and upland management areas. Areas not identified as irrigated pasture, riparian management areas, or springs and seeps are considered upland management areas. Monitoring and assessment of key sites in riparian and upland management areas includes utilization and range trend monitoring.

The 2009 range trend data examines differences compared to baseline conditions on the ranch leases before and after the implementation of the LORP. Baseline monitoring was conducted on six leases (Twin Lakes, Blackrock, Thibaut, Islands, Lone Pine, and Delta) from 2002 to 2007. All range trend monitoring prior to July 2007 will be considered baseline or preproject monitoring. All monitoring conducted after 2007 will be considered post-implementation monitoring.

A description of monitoring methods, data compilation and analysis techniques can be found in the *2008 LORP Monitoring, Adaptive Management and Reporting Plan*. Descriptions of the range trend monitoring sites and their locations on the leases can be found in the individual lease monitoring narratives and maps in this section.

In 2009 an additional range trend transect was established on the Intake Lease, within the LORP project area. This was not established earlier due to the construction activities revolving around the Intake. In January 2009, within the LORP project area, additional monitoring transects were established in upland pastures. The majority of the additional identified monitoring plots were either located on Saline Bottoms or Sodic Fan ecological sites. These transects were not read because the apparent trend was stable based on reference plant communities associated with the sites. Utilization in these areas has been conservative to moderate over the past several years and was not at risk under the current grazing regimes.

Utilization is compliance monitoring and involves determining whether the utilization guidelines set forth in the grazing plans are being adhered to. Similar to precipitation data, utilization data alone cannot be used to assess ecological condition or trend. Utilization data is used to assist in interpreting changes in vegetative and soil attributes collected from other trend monitoring methods.

Following implementation of the grazing management plans, the utilization standard for riparian management areas is 40%. The utilization standard for upland areas is 65% if grazing occurs during the plant dormancy season. The standard for upland areas is 50% if grazing occurs during the active plant growing period; however, if the pasture is completely rested for a minimum of 60 continuous days during the latter part of the active stage to allow seed set, allowable forage utilization is 65%.

These standards are not expected to be met precisely every year because of the influence of annual climatic variation, livestock distribution and the inherent variability associated with techniques for estimating utilization. Rather, these levels should be reached over an average of several years. If utilization levels are consistently 10% above or below desired limits during this period then adjustments should be implemented (Holecheck and Galt, 2000; Smith et al., 2007).

Range trend monitoring involves the quantitative sampling of the following attributes: nested frequency of all plant species, canopy cover estimates for herbaceous plant species, line intercept sampling for shrub canopy cover, estimates for ground cover, shrub density, and age classification. Photo documentation of the site conditions is included as part of range trend monitoring.

Range trend monitoring at permanent transects provides quantitative data to determine the state of monitoring sites relative to baseline conditions and how a given site compares to the desired plant community. The desired plant community can be one of several plant communities that may occupy a site or one that has been identified through a management plan to best meet the plan's objective for the site. The desired plant community must protect the site as a minimum and may be described as dynamic, changing through time, or within a range of variability (Bedell, 1988). Until site-specific objectives are established, the desired plant community, which will serve as the benchmark for evaluating condition, will be the "reference plant community" described in the ecological site description for a site. The reference plant community is the historic climax or potential plant community described for each ecological site.

Ecological site descriptions are a tool developed by USDA Natural Resource Conservation Service (NRCS) that can be used to assist in management decisions. Ecological sites are distinct units distinguished between one another by significant differences in potential vegetation composition or production between soils (NRCS, 2003). Ecological site descriptions are represented spatially as soil map units, developed from soil survey data in the Owens Valley.

Soil surveys in the area were conducted by NRCS and the final data can be found in the *Soil Survey of Benton-Owens Valley Area, California, Parts of Inyo and Mono Counties* (USDA NRCS, 2002). Vegetation data used to develop the ecological site descriptions were collected by LADWP between 1984 and 1994. This vegetation data is also referred to as "baseline" as described in the *Green Book for the 1990 Long-Term Groundwater Management Plan for the Owens Valley and Inyo County.* Ecological site descriptions include the expected production (pounds per-acre) for each soil map unit based on growing conditions (normal, favorable, unfavorable). Yearly growing conditions are based on annual precipitation data (October through September).

Nested frequency, cover, and shrub age classification data are presented for each lease and are presented as range trend transect data tables for each sampling transect and sampling year. To compare range trend sites to the associated reference plant community in the ecological site descriptions, the soil map unit that each transect was located on was cross-referenced to the *Soil Survey of Benton-Owens Valley Area, California*, *Parts of Inyo and Mono Counties* (USDA NRCS, 2002). The soil map unit narrative references the ecological site descriptions. The ecological site description describes the potential plant community by percent composition by dried weight of the major plant species. The potential plant community information does not set a specific percent composition for each species, but specifies an expected range of abundance of each of the major plant species by soil type and ecological site. The ecological site descriptions currently available for this region (Major Land Resource Area-29[MLRA 29]) only provide plant species composition in terms of percent composition by relative weight. The average cover values for each plant species by transect were converted to biomass (grams per-meter squared), and then pounds per-acre using conversion factors based on locally collected data provided by Montgomery-Watson Harza. Conversion factors were not available for all plant species, particularly annual and perennial forbs. In this case, a conversion factor for another species was selected and used based on similarity of growth form and habits.

The ecological site on the LORP where the majority of land management monitoring transects are located is the moist floodplain ecological site (MLRA 29-20). The site describes axial-stream floodplains. This ecological site does not include actual river or stream banks. Stream bank information is available from the rapid assessment survey (RAS) reports presented elsewhere in this document. Moist floodplain sites are dominated by saltgrass and to a lesser extent alkali sacaton and beardless wildrye. Only 10% of the total plant community is expected to be composed of shrubs and the remaining 10% forbs.

Saline Meadow ecological sites (MLRA 29-2) are the second most commonly encountered ecological sites on the LORP range trend sites. These sites are located on fan, stream, lacustrine terraces, and may also be found on axial stream banks. Potential plant community groups are 80% perennial grass with a larger presence of alkali sacaton than moist floodplain sites. Shrubs and trees comprise up to 15% of the community while forbs are only 5% of the community at potential. Saline Bottom (MLRA 29-7) and Sodic Fan (MLRA 29-5) ecological sites were also associated with several range trend sites. These are more xeric stream and lacustrine terrace sites. Saline Bottom ecological sites still maintain up to 65% perennial grasses, the majority of which is alkali sacaton, while shrubs compose up to 25% of the plant community, and forbs occupy the remaining 10%. Sodic Fan ecological sites are 70% shrubs, primarily Nevada saltbush (*Atriplex torreyi*), with a minor component of alkali sacaton of up to 25% and 5% forbs.

A comparison of existing conditions to the reference plant community was done using the protocols outlined in the *National Range and Pasture Handbook* (NRCS, 2003) during the 2002-2007 baseline period. Sites were placed in one of four classes based on their similarity to the reference plant community: (0–25%), (26-50%), (51–75%), and (76-100%). According to Holechek et al. (2004), maintaining sites in "late seral condition" which corresponds to 51-75% similarity to the reference community will provide adequate vegetation cover for soil stability, wildlife diversity, and moderate livestock production. Maintaining sites at 76-100% of climax or site potential may maximize soil stability and returns from livestock production. With regards to the ecological site descriptions for the Owens Valley, management objectives for a given area may or may not correlate directly to high similarity indexes or different seral conditions. For example, a portion of the reference plant communities described for the moist floodplain ecological site allow for a species composition (dry weight) of 10% for shrubs and 80% for perennial grass; optimum wildlife habitat for a particular species might require more woody plants than allowed for and livestock production would improve with a greater percent composition of perennial grass and a decrease in shrubs. Each of these scenarios are feasible through different management prescriptions but none would reflect a high similarity to the reference plant community for the ecological site. Furthermore, due to historical or existing disturbances or the presence of nonnative species, attaining "excellent condition" or 76-100% similarity may not be feasible.

It is important to point out that reference plant communities associated with ecological sites are amalgamations of both existing reference sites and professional judgment of what the site's potential could have been under pristine conditions. The reference plant community is a conceptual model intended to help managers gauge how a site compares to what potentially could be found on similar sites; to expect any existing location to identically match the described community would be erroneous. Estimating how similar a given site is to its potential described in the ecological site description is useful when conducting an inventory across an area but if repeat monitoring is available for the site (as it is for the LORP leases) changes over time (trend), when compared to baseline data collected at the same location, will be more effective approach to assessing the trend of that particular key area because comparisons are made directly to the site and not between the key area and a reference plant community in an ecological site description which ultimately has no physical existence. For this reason similarity indices were not calculated in 2009 and discussions in trend will not focus on changes in similarity indices. They are presented to assist in describing the general condition of the site.

Reference plant community data is derived from annual aboveground production (dry weight). The vegetative attribute of annual production and canopy cover are very sensitive to annual growing conditions and will therefore vary in accordance to natural climatic fluctuations. Annual production and canopy cover are inappropriate attributes to interpret long-term impacts of management decisions on plant communities when compared to other plant monitoring methods such as nested frequency.

Because frequency data is sensitive to plant densities and dispersion, frequency is an effective method for monitoring and documenting changes in plant communities (Mueller-Dombois and Ellenberg, 1974; Smith et al., 1986; Elzinga, Salzer et al., 1988; BLM 1996; Heywood and DeBacker, 2007). For this reason frequency data was the primary means for evaluating trend at a given site. Based on recommendations for evaluating differences between summed nested frequency plots (Smith et al.,1987 and Mueller-Dombois and Ellenberg, 1974), a Chi-Square analysis with a Yate's correction factor was used to determine significant differences between years. Analysis compared 2009 data to the prior sampling period. If there were significant differences, 2009 results were compared to all sampling events during the baseline period to determine if results in 2009 were ecologically significant or remained within the typical range of variability observed for that particular site.

During the preproject period, a range of environmental conditions were encountered including "unfavorable" growing years when precipitation in the southern Owens Valley was less than 50% of the 1970-2009 average, "normal" years, when precipitation was 50-150% of average, and "favorable" conditions when precipitation was greater than 150% of average. Many of the monitoring sites responded to the variability in precipitation during the baseline period, this provided the Watershed Resources staff an opportunity to sample across a broad amplitude of ecological conditions for these sites which contributed to a robust baseline dataset. Data from the Lone Pine rain gauges are used to determine the growing conditions for each sampling year on the Islands, Lone Pine, and Delta Leases. Precipitation data from Independence will be used for the Thibaut and Blackrock Leases, and data from the Intake will be used for the Twin Lakes Lease. Years receiving 50-150% of the long-term average precipitation (+/- one standard deviation unit) are considered "normal," while years with precipitation values of less than 50% of the average are "unfavorable," and greater than 150% of average are considered "favorable." Precipitation data is located in the Land Management Appendix 2.

6.4. Irrigated Pastures

Monitoring of irrigated pastures consisted of Irrigated Pasture Condition Scoring following protocols developed by the NRCS, 2001. Irrigated pastures that score 80% or greater are considered to be in good to excellent condition. If a pasture rates below 80%, changes to pasture management will be implemented.

Irrigated pasture condition scoring for 2009 took place in all irrigated pastures for the Lone Pine and Thibaut leases that rated below 80% during 2008. The results of those pastures evaluated in 2009 will be described within each individual lease description. Irrigated pasture condition scoring for all pastures will take place again in 2011.

6.5. Fencing

The LORP EIR identified approximately 44 miles of new fencing to be built in the project area to improve grazing management and help meet the LORP goals. The new fencing consisted of riparian pastures, upland pastures, riparian exclosures, rare plant exclosures, and rare plant management areas. Fence construction began in September 2006 and was completed in

February 2009 with the total fence miles constructed being approximately 50 miles. The fencing that was completed in January and February of 2009 took place on the Twin Lakes, Blackrock, and Lone Pine Leases. A portion of the boundary fence (1.5 miles) between the Twin Lakes and Blackrock Leases was replaced. The Blackrock Lease has two 0.25-acre rare plant exclosures built in the Robinson and Little Robinson Pastures and two riparian exclosures were constructed in the White Meadow Riparian and Wrinkle Riparian Fields. An additional fence in the White Meadow Field was also constructed due to the grazing prescriptions placed on the Winterton Unit of the BWMA during periods of flooding. The Lone Pine Lease had a drift fence constructed just north of U.S. Highway 136 on the east side of the river. This fence was constructed by the lessee with materials provided by LADWP.

6.6. Rare Plants

Baseline data for the LORP rare plant trend plots were collected during the week of June 24-30, 2009. The sampling period was later in the growing season than usual due to unseasonably cool, early summer weather. Within the LORP there are 15 trend plots within four rare plant populations on two separate ranch leases, Blackrock and Thibaut Leases. Target species are *Sidalcea covillei* and *Calochortus excavatus. S. covillei* is a state endangered species, endemic to the Owens Valley. It occurs in alkali meadows. *C. excavatus* is not a State or federally listed but is considered rare in its range. A mesic species, *C. excavatus* occurs in alkaline meadows and seeps transitioning into chenopode scrubland. Data on recruitment, persistence, size of individuals, flowering and seed presence were collected. These plots will be monitored for an additional five years to evaluate population trends. If trends are static or suggest that grazing is beneficial the exclosure fencing will be removed following the fifth year of monitoring. In contrast, if trends in data support that exclosures are needed to protect these populations of *S. covillei*, then LADWP will construct additional exclosures (or a practical variation thereof) and monitoring will continue as needed.

6.6.1. Methods

The LORP rare plant trend plots were established inside and outside exclosures by sinking a piece of rebar into the earth and taking a GPS point of the location. The plots were relocated using a hand-held GPS unit and a metal detector. Two 50-meter measuring tapes were used to delineate the plot into four sections with a diameter of 7.24 meters. Target species were flagged with a pin flag to aid in accurately identifying all individuals within the plot. Photos were taken in all cardinal directions depicting the plot area containing flagged plants. One measuring tape was then attached to the rebar in the center of the plot to record the distance of individuals within a radius of 3.62 meters. A compass was used to record the bearing of individuals from the center of the plot. This is in effort to relocate individual plants utilizing the distance and bearing from the center of the plot. Data on recruitment, persistence, size of individuals, and flowering and seed presence were collected.

6.7. 2009 Land Use Results

The following sections are presented by ranch lease. The discussion will include an introduction describing the lease operations, pasture types, a map of the lease, utilization results from 2009, a summary of range trend results at the lease level and a presentation of range trend results by transect. The tables refer to plant species by plant symbol. Refer to Appendix 1, which contains a list of the plant species, scientific names, common names, plant symbol, and functional group assignment for species encountered on the range trend transects. Appendix 3 contains photos for all monitoring transects.

6.7.1. Intake Lease (RLI-475)

The Intake Lease is used to graze horses and mules employed in a commercial packer operation. The lease is comprised of two fields – the Intake and the Big Meadow Field (approximately 102 acres). The Intake Field contains riparian vegetation and an associate range trend transect; and the Big Meadow Field contains upland and riparian vegetation. However the Big Meadow Field is not within the LORP project boundaries. Therefore there are no utilization or range trend transects in the Big Meadow Field due to a lack of adequate areas to place a transect that would meet the proper range trend/utilization criteria. Much of the meadow in the Big Meadow Field has been covered with dredged material from the LORP Intake. The Big Meadow and Intake Fields were not used by livestock during the construction of the Intake structure which lasted until 2008-09 grazing season. There are no irrigated pastures on the Intake Lease. There are no identified water sites needed for this pasture and no riparian exclosures planned due to the limited amount of riparian area within the both pastures. During the 2009 LORP Rapid Assessment Survey (RAS), no supplement sites were documented in this field. A break in the Big Meadow Field fencing was noted during the 2008 RAS and was repaired before 2009. No controlled burns or wildfires occurred on this lease in 2009.

One new range trend/utilization transect was placed in the Intake Field (Stewart_01) at the end of grazing season during range trend data collection in August. Baseline range trend data was taken at that time and ungrazed plant heights for the 2010 grazing season were collected. The East Field was not grazed by livestock in 2009, no utilization estimates were made for the pasture.

Summary of Range Trend Data and Conditions

Monitoring site photos are presented in Appendix 3 – Section 1. STEWART_01 is located in the riparian Intake Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, which corresponds to the Moist Floodplain ecological site. The site was sampled for the first time in 2009. The site appears stable with both alkali sacaton and saltgrass present on the site.

Table 1. Frequency (%), STEWART_01

Life Forms	Species	2009
Perennial Forb	GLLE3	2
Perennial Graminoid	DISP	133
	JUBA	11
	SPAI	47
Shrubs	ATTO	4
	ERNA10	2
Nonnative Species	BAHY	18

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 2. Cover (%) Forbs, Graminoids, Sub-shrubs STEWART_01

Life Forms	Species	2009
Perennial Forb	GLLE3	T
Perennial Graminoid	DISP	18
	JUBA	T
	SPAI	11
Nonnative Species	BAHY	T

Table 3. Cover (%) Shrubs STEWART_01

Species	2009
ATTO	7.6
ERNA10	0.2
Total	7.7

Table 4. Ground Cover (%) STEWART_01

Substrate	2009
Dung	1
Litter	73
Standing Dead	0
Bare Ground	26

Table 5. Shrub Densities and Age Classes STEWART_01

	ATTO	ERNA10
Age Class	**2009**	**2009**
Seedling	16	0
Juvenile	3	0
Mature	15	0
Decadent	2	1
Total	36	1

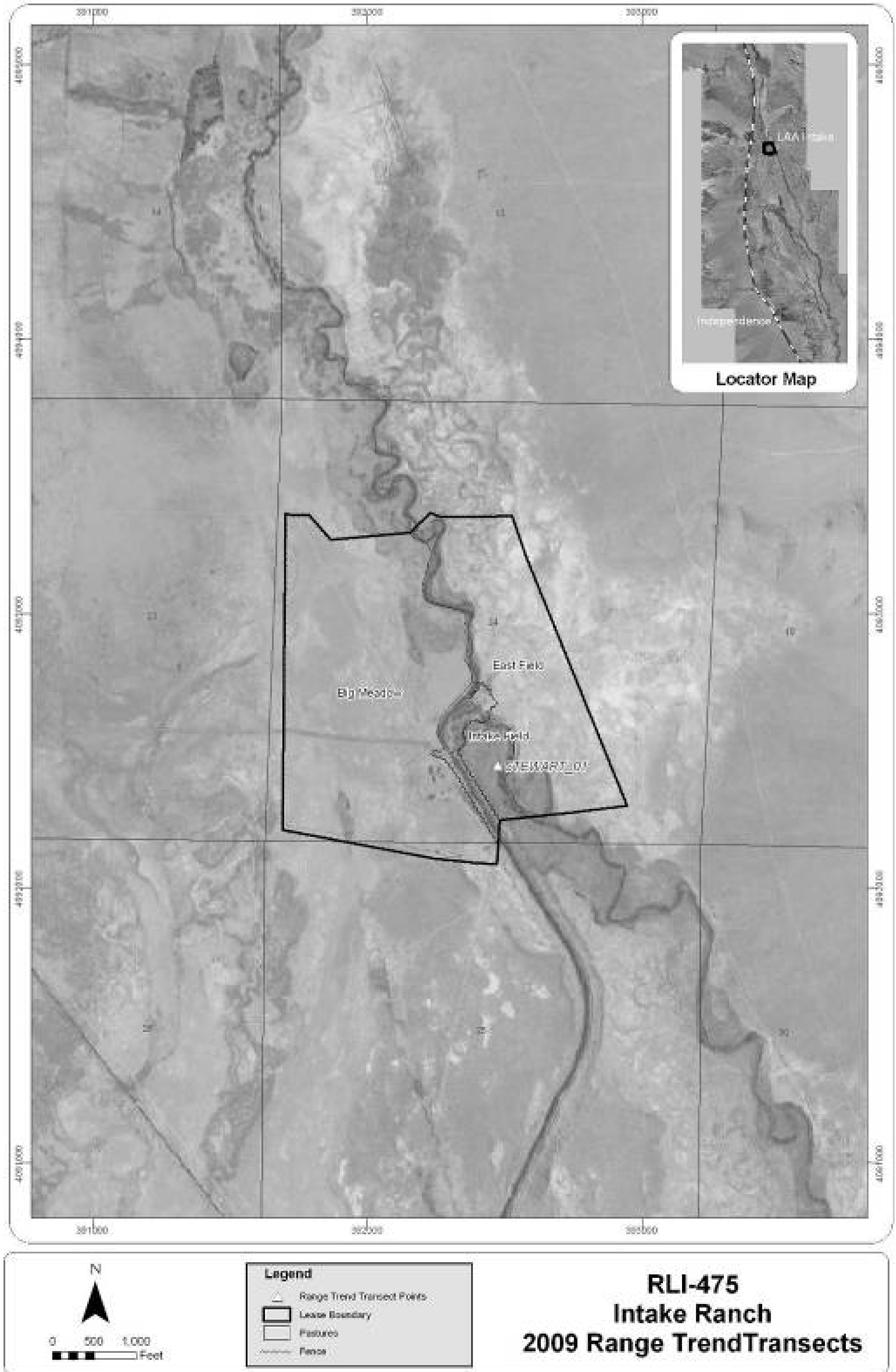
<u>Summary of Utilization</u>

<u>2010 Grazing Season</u>

The table below presents targeted stubble heights (inches) by species for the 2010 grazing season. These measurements are intended to be used throughout the grazing season to help gauge utilization for the 2010 grazing season.

Table 6. Target Stubble Heights (inches) for Key Species by Pasture, Intake Lease

Pasture	Transect	DISP	LETR5	SPAI
Intake	Stewart_01	3		12



Land Use Figure 1. Intake Lease RLI-475, Range Trend Transects

6.7.2. Twin Lakes Lease (RLI-491)

The Twin Lakes Lease is a 4,912-acre cow/calf operation situated just south of the LAA Intake. It includes a reach of the Owens River that lies mainly north of Twin Lakes, which is located at the southern end of the lease. Of the 4,912 acres, approximately 4,200 acres are used as pastures for grazing; the other 712 acres are comprised of riparian/wetland habitats and open water. In all but dry years, cattle usually graze the lease from late October or early November to mid-May.

There are four pastures on the Twin Lakes lease within the LORP boundary: Lower Blackrock Riparian Field, Upper Blackrock Field, Lower Blackrock Field, and the Holding Field.

Summary of Utilization

The Lower Blackrock Riparian, Upper Blackrock Riparian, and Lower Blackrock Fields contain both upland and riparian vegetation. The Holding Field contains only upland vegetation. There are no irrigated pastures on the Twin Lakes Lease. Range trend and utilization transects exist in all fields except the Holding Field. The 2009 mid-season utilization monitoring on the Twin Lakes Lease took place in March, midway through the grazing period. End-of-season utilization values where collected soon after livestock were removed in early May. Most of the transects were below 40% utilization in the riparian areas and well below 65% in the uplands

The following tables present the summarized utilization data for each pasture, for the transects in each field, and by species for each transect for the current year.

Table 1. End of Grazing Season Utilization for Fields on the Twin Lakes Lease, RLI-491, 2009

Lower Blackrock Riparian Field*	32%
Holding Field	No transect
Upper Blackrock Field*	40%
Lower Blackrock Field	9%

**Riparian pastures (40% utilization standard)*

Table 2. End of Grazing Season Utilization for Transects on the Twin Lakes Lease, RLI-491, 2009

Lower Blackrock Field	BLKROC_37	7%
Lower Blackrock Riparian Field	BLKROC_RIP_07*	45%
	TWINLAKES_03*	19%
Upper Blackrock Field	BLKROC_RIP_05*	48%
	BLKROC_RIP_06*	53%
	BLKROC_RIP_08*	35%
	INTAKE_01*	19%

**Riparian pastures (40% utilization standard)*

Table 3. Utilization at Each Transect at the Species Level, Twin Lakes Lease, RLI-491, End of Grazing Season, 2009

	Transect	DISP	LETR5	SPAI
Lower Blackrock Riparian Field	BLKROC_RIP_07	45%		
	TWINLAKES_03	19%		13%
Upper Blackrock Field	BLKROC_RIP_05	45%		52%
	BLKROC_RIP_06	47%		65%
	BLKROC_RIP_08	35%		
	INTAKE_01	15%		21%
Lower Blackrock Field	BLKROC_37	8%		0%

At the pasture level, utilization was within allowable use, with 40% or less in riparian pastures, and well below the 65% threshold in the upland pasture, Lower Blackrock Field. At the transect level, Upper Blackrock Field exceeded allowable levels in the upper portion of Upper Blackrock Field on transects BLKROC_RIP_05 (48%) and BLKROC_RIP_06 (47%). Past fire recovery in Drew Slough should provide a marked increase in forage in the Lower Blackrock Field. Grazing pressure in the Upper Blackrock Field can therefore be reduced by shifting use to the Lower Blackrock Field.

2010 Grazing Season

The table below presents targeted stubble heights (inches) by species for the 2010 grazing season. These measurements are intended to be used throughout the grazing season to help gauge the utilization on the lease. The 2010 not-to-exceed stubble height is based on the ungrazed height of key forage species on the lease.

Table 4. Target Stubble Heights (inches) for Key Species by Pasture, Twin Lakes and 4-J Lease

Pasture	Transect	DISP	LETR5	SPAI
Lower Blackrock Riparian Field	BLKROC_RIP_07	4		
Upper Blackrock Field	BLKROC_RIP_05	3		8
	BLKROC_RIP_06	4		10
	BLKROC_RIP_08	3		7
	INTAKE_01	2		7
Lower Blackrock Field	BLKROC_37	2		5
	TWINLAKES_03	3		6
	BLKROC_FIELD_04	6		
	TWINLAKES_02	2		2

Summary of Range Trend Data and Conditions

There are seven range trend sites on the Twin Lakes Lease. Monitoring site photos are presented in Appendix 3 – Section 2. The Moist Flood Plain ecological sites are distributed between two sites (TWINLAKES_04 and TWINLAKES_06) in the historical dry reach which had not received any significant river flows prior to late 2006. TWINLAKES_03 is also in the dry reach section but has clearly benefited from a shallower water table than the other two sites, both prior and following return flows to the river. The mean similarity index during the baseline period for TWINLAKES_03 was 64%, while TWINLAKES_04 and TWINLAKES_05 were 4% and 19%, respectively. The Saline Meadow sites; TWINLAKES_05 was 42% and INTAKE_01 was 75%. Currently TWINLAKES_05 is submerged as part of the Drew Slough unit in the BWMA. The two Saline Bottom sites had a similarity index of 48% (BLKROC_37) and 49% (TWINLAKES_02). Changes in plant frequency beyond what was observed during the baseline period were a significant increase in saltgrass on TWINLAKES_03 and INTAKE_01, a significant increase in Nevada saltbush on TWINLAKES_06, and a significant decline in rubber rabbitbrush on TWINLAKES_02 as a result of the Fort Fire in February 2009. The moist floodplain portions located on the historical dry reach, which were not already in good condition prior to returned flows, remain in poor status while TWINLAKES_03 remained stable and in good condition during the baseline period (prereturn flows) and in 2009.

TWINLAKES_02

TWINLAKES_02 is located in the Blackrock Field on the Pokonahbe-Rindge Family Association soil series, which corresponds to the Saline Bottom Wetland ecological site. Presently there is no ecological site description for Saline Bottom Wetland ecological site. Referencing the site to a Saline Bottom ecological site, the similarity index ranged between 42%-62%. The site would be in a higher ecological condition if the wetland component was accounted for in the ecological site description because of the relatively greater abundance of mesic graminoids such as *Juncus balticus* and *Spartina gracilis* present on the site, which are typically minor components on the more xeric Saline Bottom ecological site.

The transect was burned in mid-February, 2009. Shrub cover prior to the burn was moderate which resulted in a cooler burn when compared to other portions further south in Drew Slough where shrub cover was high. Because of the cool fire, a decrease in shrub frequency, shrub cover, and shrub recruitment was observed in 2009 with little change in herbaceous frequency and a slight decrease in herbaceous cover. Increased herbaceous frequencies are likely in subsequent years as a result from the dramatic reduction in woody species on the site. Because of the fire, utilization in 2009 was not estimated, but there was substantial growth in the summer of 2009 allowing for stubble heights estimates for the 2010 grazing season.

Table 5. TWINLAKES_02, Comparison to Saline Bottom Ecological Site

Ecological Site: Saline Bottom		% Composition by Weight				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%		T		
Perennial Forbs	ASLE8	0-2%				
	CASTI	0-2%				
	STEPH	0-2%				
Other Perennial Forbs		0-2%	1%	1%	T	T
Perennial Graminoids	SPAI	25-45%	34%	17%	18%	15%
	DISP	10-20%	21% (20)	15%	24% (20)	17%
	LECI	5-10%		1%	T	
	JUBA	0-2%	27% (2)	18% (2)	11% (2)	16% (2)
	POSE	0-2%				
	ORHY	0-2%				
Other Perennial Graminoids		0-2%	8% (2)	3% (2)	1%	12% (2)
Shrubs	SAVE4	5-15%				
	ATCO	5-10%				
	ATPA3	2-5%				
	MACA17	0-3%				
	ERNA10	0-3%		30% (3)	30% (3)	27% (3)
	TEGL	0-3%				
	ATTO	0-3%	8% (3)	15% (3)	15% (3)	12% (3)
	ARTRW8	0-3%				
	SUMO	0-3%				
Other Shrubs		0-5%				
Nonnative Species		0%		T		1%
Total Forbs		10%	1%	1%	0%	0%
Total Perennial Graminoids		65%	90%	54%	54%	60%
Total Shrubs		25%	8%	45%	46%	39%
Total Nonnative Species		0%	0%	0%	0%	1%
Similarity Index			62%	44%	47%	42%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 6. Utilization, Weighted Average, TWINLAKES_02

2007	2008
17%	17%

Table 7. Utilization by Species, TWINLAKES_02

	DISP	FEAR	LECI4	SPAI	SPGR
2007	25%		43%	11%	5%
2008	16%	0%		30%	

Table 8. Frequency (%), TWINLAKES_02

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATPH	0	2	1	0	0
	CHENO	0	2	0	0	0
	CHHI	0	0	2	0	0
	CLOB	0	8	3	0	0
Perennial Forb	NIOC2	3	4	2	3	5
	PYRA	0	6	2	7	9
	STEPH	0	3	0	0	0
Perennial Graminoid	DISP	75	61	65	60	73
	JUBA	73	96	103	78	72
	LECI4	0	4	16	0	0
	LETR5	3	4	0	0	0
	POSE	0	0	0	0	2
	SPAI	60	53	69	44	36
	SPGR	34	20	19	65	57
Shrubs	ATTO	0	6	5	5	0
	ERNA10	12	28	24	27	1**
Nonnative Species	FESTU	0	3	1	0	0
	POA	0	0	0	11	0**

** indicates a significant difference, α≤0.1, **≤0.05*

Table 9. Cover (%) Forbs, Graminoids, Sub-shrubs TWINLAKES_02

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATPH	0	T	T	0	0
	CHENO	0	0	0	0	0
	CHHI	0	T	T	0	0
	CLOB	0	T	T	0	0
Perennial Forb	NIOC2	T	1	T	T	T
	PYRA	0	T	T	T	T
	STEPH	0	T	0	0	0
Perennial Graminoid	DISP	4	7	10	7	4
	JUBA	5	9	4	6	2
	LECI4	0	1	T	0	0
	LETR5	0	T	0	0	0
	POSE	0	0	0	0	T
	SPAI	9	12	11	8	5
	SPGR	2	1	T	5	2
Nonnative Species	FESTU	0	T	T	0	0
	POA	0	0	0	0	0

Table 10. Cover (m) Shrubs TWINLAKES_02

Species	2003	2004	2007	2009
ATTO	6.4	5.9	4.3	0.3
ERNA10	18.3	15.9	13.5	0.0
Total	24.7	21.8	17.8	0.3

Table 11. Ground Cover (%) TWINLAKES_02

Substrate	2002	2003	2004	2007	2009
Bare Soil	31.2	24.6	32.9	42.0	88.0
Dung	T	1.3	1.3	1.2	T
Litter	67.9	66.4	46.0	58.0	12.0
Rock	0.0	0.0	0.0	T	0.0

Table 12. Shrub Densities and Age Classes TWINLAKES_02

	ATTO					ERNA10					SAVE4		
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2002**	**2003**	**2004**	**2007**	**2009**	**2003**	**2004**	**2007**
Seedling	1	194	3	2	0	1	6	7	0	0	0	0	0
Juvenile	7	17	24	23	4	25	46	55	25	0	0	0	0
Mature	0	6	8	17	1	15	17	19	47	0	1	1	0
Decadent	1	1	2	1	2	2	1	4	12	1	0	0	1
Total	9	218	37	43	7	43	70	85	84	1	1	1	1

TWINLAKES_03

TWINLAKES_03 is located in the Lower Blackrock Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, which corresponds to the Moist Floodplain ecological site. The similarity index during baseline period ranged between 63%-65%, placing it in good ecological condition, explained by the dominance of saltgrass on the site. Nevada saltbush is much greater than the described potential for the site. The site also lacks in diversity of perennial grasses. Frequency for saltgrass and Nevada saltbush increased between 2009-07. Saltgrass frequency was significantly higher than all previous sampling events.

Table 13. TWINLAKES_03, Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	Species	Site Potential	2002	2003	2004	2007
Annual Forbs	AAFF	Trace to 2%				
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%			T	4% (2)
	HECU3	0-2%				
Other Perennial Forbs		0-2%				
Perennial Graminoids	DISP	40-60%	61% (60)	66% (60)	64% (60)	84% (60)
	SPAI	10-20%			T	T
	LETR5	5-15%				
	JUBA	5-10%				
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	39%(3)	30% (3)	34% (3)	12% (3)
	ERNA10	0-3%				
	ROWO	0-3%				
	SAEX	0-3%				
Other Shrubs	SAVE4	0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species	NONA	0%		4%	2%	
Total Forbs		5-10%	0%	0%	0%	4%
Total Perennial Graminoids		80%	61%	66%	64%	84%
Total Shrubs		5-15%	39%	30%	34%	12%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	4%	2%	0%
Similarity Index			63%	63%	63%	65%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 14. Utilization, Weighted Average, TWINLAKES_03

2007	**2008**	**2009**
82%	28%	19%

Table 15. Utilization by Species, TWINLAKES_03

	DISP	SPAI
2007	82%	
2008	25%	50%
2009	19%	13%

Table 16. Frequency (%), TWINLAKES_03

Life Forms	Species	2002	2003	2004	2007	2009
Perennial Forb	SUMO	0	0	5	11	15
Perennial Graminoid	DISP	145	144	141	153	163*
	SPAI	0	1	5	1	2
Shrubs	ATTO	48	0	64	18	31*
Nonnative Species	BAHY	0	37	27	0	26**

** indicates a significant difference, α≤0.1, **≤0.05*

Table 17. Cover (%) Forbs, Graminoids, Sub-shrubs TWINLAKES_03

Life Forms	Species	2002	2003	2004	2007	2009
Perennial Forb	SUMO	0	0	0	0	0
Perennial Graminoid	DISP	47	39	34	47	53
	SPAI	0	T	T	T	1
Nonnative Species	BAHY	0	2	1	0	1

Table 18. Cover (m) Shrubs TWINLAKES_03

Species	2003	2004	2007	2009
ATTO	17.0	17.0	6.4	8.4
SUMO	0.0	0.1	2.4	0.6
Total	17.0	17.1	8.8	9.0

Table 19. Ground Cover (%) TWINLAKES_03

Substrate	2002	2003	2004	2007	2009
Bare Soil	8.1	7.8	6.6	10.7	6.0
Dung	3.7	5.3	3.1	3.1	0.8
Litter	83.7	63.6	64.3	86.2	93.1
Rock	0.0	4.8	14.5	0.0	0.0
Standing Dead	0.0	0.0	0.0	23.4	10.5

Table 20. Shrub Densities and Age Classes TWINLAKES_03

	ATTO					SUMO				
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2002**	**2003**	**2004**	**2007**	**2009**
Seedling	10	0	89	0	3	0	0	282	0	5
Juvenile	16	289	206	20	42	1	0	200	15	52
Mature	17	47	46	17	60	0	1	3	5	12
Decadent	4	16	9	8	0	0	0	0	2	0
Total	47	352	350	45	105	1	1	485	22	69

TWINLAKES_04

TWINLAKES_04 is located in the Lower Blackrock Riparian Field in the former dry reach. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, which corresponds to the Moist Floodplain ecological site. The similarity index is poor, ranging between 4-5%. Unlike TWINLAKES_03 which has consistently benefitted from a shallow water table, TWINLAKES_04 has yet to respond favorably from returned flows into the lower Owens River. The site is predominantly Nevada saltbush, inkweed, and fivehorn smotherweed. Frequency significantly increased for fivehorn smotherweed and inkweed in 2009 when compared to 2007, inkweed frequency in 2009 was greater than baseline parameters (2002-04 and 2007). The site is visited when conducting the annual LORP utilization but has not been sampled due to the absence of key forage species. .

Table 21. TWINLAKES_04, Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%			1%	
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%	T			58%(2)
	HECU3	0-2%				
Other Perennial Forbs		0-2%				
Perennial Graminoids	DISP	40-60%	1%	T	T	
	SPAI	10-20%				
	LETR5	5-15%				
	JUBA	5-10%				
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	99% (3)	56%(3)	75% (3)	42% (3)
	ERNA10	0-3%				
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%				
Other Shrubs	SSSS	0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species	NONA	0%		44%	24%	
Total Forbs		5-10%	0%	0%	0%	58%
Total Perennial Graminoids		80%	1%	0%	0%	0%
Total Shrubs		5-15%	99%	56%	75%	42%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	44%	24%	0%
Similarity Index			4%	4%	4%	5%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 22. Frequency (%), TWINLAKES_04

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATTR	0	0	9	0	0
	CHIN2	0	0	2	0	0
	CRCI2	0	0	3	0	0
Perennial Forb	SUMO	2	0	1	9	24**
Perennial Graminoid	DISP	17	4	12	0	0
Shrubs	ATTO	5	8	27	18	13
	SUMO	0	0	0	0	0
Nonnative Species	BAHY	0	6	41	0	15**
	DESO2	0	0	7	0	0
	SATR12	0	4	82	0	0

** indicates a significant difference, α≤0.1, **≤0.05*

Table 23. Cover (%) Forbs, Graminoids, Sub-shrubs TWINLAKES_04

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATTR	0	0	T	0	0
	CHIN2	0	0	T	0	0
	CRCI2	0	0	T	0	0
Perennial Forb	SUMO	T	0	0	0	0
Perennial Graminoid	DISP	T	T	T	0	0
Nonnative Species	BAHY	0	5	1	0	3
	DESO2	0	0	T	0	0
	SATR12	0	4	7	0	0

Table 24. Cover (m) Shrubs TWINLAKES_04

Species	2003	2004	2007	2009
ATTO	13.6	22.4	11.2	17.9
SUMO	0.0	0.0	20.0	27.3
Total	13.6	22.4	31.2	45.1

Table 25. Ground Cover (%) TWINLAKES_04

Substrate	2002	2003	2004	2007	2009
Bare Soil	15.1	33.3	34.4	47.2	16.2
Dung	1.4	1.9	3.9	1.5	T
Litter	83.6	64.4	63.3	48.2	83.6
Rock	0.0	0.0	9.2	0.0	0.0

Table 26. Shrub Densities and Age Classes TWINLAKES_04

	ATTO					SUMO			
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2003**	**2004**	**2007**	**2009**
Seedling	3	0	0	0	0	0	0	0	0
Juvenile	3	14	16	0	7	1	1	0	26
Mature	14	16	14	13	30	0	1	28	44
Decadent	1	11	0	1	1	0	0	0	0
Total	21	41	30	14	38	1	2	28	70

TWINLAKES_05

TWINLAKES_05 is located on the Manzanar-Division Association, 0-2% slopes soil unit which corresponds to the Saline Meadow ecological site. The transect was burned in late January 2009 and was subsequently submerged when the Drew Unit of the BWMA was flooded. Because of this, range trend sampling and utilization estimates in 2009 were not possible.

Table 27. TWINLAKES_05, Comparison to Saline Meadow Ecological Site

Ecological Site: Saline Meadow		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%		78% (2)	9% (2)	
Perennial Forbs	ANCA10	0-2%				
	CALI4	0-2%				
	PYRA	0-2%				
Other Perennial Forbs		0-2%	18% (2)	2%	6% (2)	8% (2)
Perennial Graminoids	DISP	25-50%	67% (50)	11%	29%	30%
	SPAI	25-50%			1%	
	JUBA	5-15%		T		
	LETR5	5-10%	1%	1%		
	CAREX	0-2%				
	POSE	0-2%				
	LECI	0-2%				
Other Perennial Graminoids		0-2%				
Shrubs	ATTO	0-5%	14% (5)	4%	12% (5)	24% (5)
	ERNA10	0-5%		4%	36% (5)	38% (5)
	ROWO	0-5%				
	SALIX	0-5%				
	SAVE4	0-5%				
Other Shrubs		0-5%				
Trees	SAGO	0-10%				
	POFR2	0-5%				
Nonnative Species		0%		1%	6%	
Total Forbs		5%	18%	79%	15%	8%
Total Perennial Graminoids		80%	68%	12%	31%	30%
Total Shrubs		5-15%	14%	8%	48%	63%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	1%	6%	0%
Similarity Index			58%	24%	44%	42%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table28. Utilization, Weighted Average, TWINLAKES_05

2007	**2008**
52%	21%

Table 29. Utilization by Species, TWINLAKES_05

	DISP
2007	52%
2008	21%

Table 30. Frequency (%), TWINLAKES_05

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATTR	0	156	91	0	NA
Perennial Forb	MALE3	49	60	66	61	NA
Perennial Graminoid	DISP	88	101	87	70	NA
	JUBA	0	6	8	2	NA
	LETR5	5	11	0	0	NA
	SPAI	0	0	6	0	NA
Shrubs	ATTO	17	15	45	29	NA
	ERNA10	12	30	16	18	NA
Nonnative Species	BAHY	0	18	35	0	NA

** indicates a significant difference, α≤0.1, **≤0.05*

Table 31. Cover (%) Forbs, Graminoids, Sub-shrubs TWINLAKES_05

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATTR	0	60	1	0	NA
Perennial Forb	MALE3	4	3	2	4	NA
Perennial Graminoid	DISP	11	13	7	12	NA
	JUBA	0	T	T	T	NA
	LETR5	T	1	0	0	NA
	SPAI	0	0	T	0	NA
Nonnative Species	BAHY	0	1	1	0	NA

Table 32. Cover (m) Shrubs TWINLAKES_05

Species	2003	2004	2007	2009
ATTO	4.2	2.6	8.9	NA
ERNA10	6.5	10.2	19.0	NA
Total	10.7	12.8	27.8	NA

Table 33. Ground Cover (%) TWINLAKES_05

Substrate	2002	2003	2004	2007	2009
Bare Soil	49.1	30.3	57.4	24.5	NA
Dung	3.9	1.7	1.3	2.4	NA
Litter	46.2	55.0	38.8	70.4	NA
Rock	T	0.0	0.0	0.0	NA

Table 34. Shrub Densities and Age Classes TWINLAKES_05

	ATTO					ERNA10				
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2002**	**2003**	**2004**	**2007**	**2009**
Seedling	0	32	0	0	NA	0	33	14	0	NA
Juvenile	4	29	79	29	NA	0	0	16	9	NA
Mature	2	1	1	64	NA	2	5	6	14	NA
Total	6	62	80	93	NA	2	38	36	23	NA

TWINLAKES_06

TWINLAKES_06 is located in the Lower Blackrock Riparian Field. Soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, which corresponds to the Moist Floodplain ecological site. Similarity index to the site's potential was 19% between 2006-07. Like TWINLAKES_04, the site has not yet responded to returned river flows and is dominated by shrubs, invasive annual forbs, and a scant amount of perennial grasses as the understory. Because of this, utilization is not estimated on this site. Plant frequency in 2009 indicated a significant increase in Nevada saltbush and fivehorn smotherweed. Shrub cover for Nevada saltbush showed a similar trend in 2009.

Table 35. TWINLAKES_06, Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**		
Functional Group	**Species**	**Site Potential**	**2006**	**2007**
Annual Forbs	AAFF	Trace to 2%		
Perennial Forbs	PYRA	0-2%		
	NIOC2	0-2%		
	SUMO	0-2%	61% (2)	65% (2)
	HECU3	0-2%		
Other Perennial Forbs		0-2%		
Perennial Graminoids	DISP	40-60%	14%	14%
	SPAI	10-20%		
	LETR5	5-15%		
	JUBA	5-10%		
	CAREX	0-5%		
	POSE	0-5%		
	LECI	0-5%		
Other Perennial Graminoids		0-5%		
Shrubs	ATTO	0-3%	14% (3)	21% (3)
	ERNA10	0-3%		
	ROWO	0-3%		
	SAEX	0-3%		
	SAVE4	0-3%		
Other Shrubs	SSSS	0-3%		
Trees	POFR2	2-5%		
	SALA3	2-5%		
Nonnative Species	NONA	0%	11%	
Total Forbs		5-10%	61%	65%
Total Perennial Graminoids		80%	14%	14%
Total Shrubs		5-15%	14%	21%
Total Trees		4-10%	0%	0%
Total Nonnative Species		0%	11%	0%
Similarity Index			19%	19%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.				

Table 36. Frequency (%), TWINLAKES_06

Life Forms	Species	2006	2007	2009
Perennial Forb	HECU3	0	0	8
	SUMO	48	30	29
Perennial Graminoid	DISP	57	38	32
	SPAI	0	0	10
Shrubs	ATTO	23	20	63**
Nonnative	BAHY	0	0	22**
	SATR12	11	0	0

** indicates a significant difference, α≤0.1, **≤0.05*

Table 37. Cover (%) Forbs, Graminoids, Sub-shrubs TWINLAKES_06

Life Forms	Species	2006	2007	2009
Perennial Forb	HECU3	0	0	2
	SUMO	0	0	0
Perennial Graminoid	DISP	6	8	5
	SPAI	0	0	T
Nonnative Species	BAHY	0	0	2
	SATR12	5	0	0

Table 38. Cover (m) Shrubs TWINLAKES_06

Species	2006	2007	2009
ATTO	5.4	11.3	50.2
SUMO	30.5	44.8	14.9
Total	35.9	56.1	65.0

Table 39. Ground Cover (%) TWINLAKES_06

Substrate	2006	2007	2009
Bare Soil	26.8	20.1	9.7
Dung	4.9	5.5	1.6
Litter	67.9	74.4	88.7
Rock	0.0	0.0	0.0
Standing Dead	8.2	4.3	4.5

Table 40. Shrub Densities and Age Classes TWINLAKES_06

	ATTO			SUMO		
Age Class	**2006**	**2007**	**2009**	**2006**	**2007**	**2009**
Seedling	5	0	0	0	0	0
Juvenile	80	6	21	116	0	22
Mature	17	29	68	68	57	24
Decadent	2	4	5	0	1	1
Total	104	39	94	184	58	47

INTAKE_01

INTAKE_01 is located in the Upper Blackrock Riparian Field. The soils are mapped as Torrifluvents-Fluvaquentic Endoaquolls Complex; but the majority of the study plot is located on the adjacent soil unit, Torrifluvents, 0-2% slopes, which is associated with the Saline Meadow ecological site. Site similarity to the potential ranged during the baseline monitoring period between 71-77%, placing the site in high ecological condition. Frequency for saltgrass significantly increased in 2009 when compared to 2007 but remained within baseline monitoring parameters. Vegetative attributes in 2009 have stayed within previously observed limits on the transect indicating that trend appears to be static.

Table 41. INTAKE_01, Comparison Saline Meadow Ecological Site

Ecological Site: Saline Meadow		**% Composition by Weight**				
Functional Group	Species	Site Potential	2002	2003	2004	2007
Annual Forbs	AAFF	Trace to 2%		6% (2)	T	T
Perennial Forbs	ANCA10	0-2%				
	CALI4	0-2%				
	PYRA	0-2%				
Other Perennial Forbs		0-2%		2%	1%	
Perennial Graminoids	DISP	25-50%	20%	13%	10%	13%
	SPAI	25-50%	71% (50)	59% (50)	57% (50)	54% (50)
	JUBA	5-15%	1%	3%	1%	1%
	LETR5	5-10%				
	CAREX	0-2%				
	POSE	0-2%				
	LECI	0-2%				
Other Perennial Graminoids		0-2%				
Shrubs	ATTO	0-5%	4% (3)	4% (3)	9% (3)	10% (3)
	ERNA10	0-5%		5% (3)	18% (3)	16% (3)
	ROWO	0-5%				
	SALIX	0-5%				
	SAVE4	0-5%				1%
Other Shrubs		0-5%	2%	5% (3)	4% (3)	6% (3)
Trees	SAGO	0-10%				
	POFR2	0-5%				
Nonnative Species		0%				
Total Forbs		5%	2%	10%	1%	0%
Total Perennial Graminoids		80%	92%	76%	68%	68%
Total Shrubs		5-15%	6%	14%	31%	32%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	0%	0%
Similarity Index			76%	77%	71%	74%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 42. Utilization, Weighted Average, INTAKE_01

2007	**2009**
44%	19%

Table 43. Utilization by Species, INTAKE_01

	DISP	SPAI
2007	29%	55%
2009	15%	21%

Table 44. Frequency (%), INTAKE_01

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	2FORB	0	0	1	0	0
	ATPH	0	18	5	0	0
	ATTR	0	0	2	0	0
	CHST	0	2	0	0	0
	CLEOM2	0	2	0	0	0
	CLOB	0	3	0	0	0
	CRCI2	0	0	7	0	0
	ERIAS	0	23	0	0	0
	ERIOG	0	5	0	0	0
	ERMA2	0	0	2	0	0
	MEAL6	0	0	10	0	0
Perennial Forb	MACA2	17	0	0	0	0
	MALAC3	0	2	1	0	0
	STEPH	0	18	16	0	0
	SUMO	3	4	4	2	2
Perennial Graminoid	DISP	60	54	67	52	82**
	JUBA	14	19	15	11	11
	SPAI	97	117	103	105	109
Shrubs	ATCO	24	15	23	19	25
	ATPA3	0	0	0	1	1
	ATTO	0	10	8	6	3
	ERNA10	9	22	27	26	28
	MACA17	0	0	0	14	18
Nonnative Species	BAHY	0	0	0	0	10
	BRTE	0	0	1	0	0
	POMO5	0	3	0	0	0
	BRRU2	0	0	0	0	1

** indicates a significant difference, α≤0.1, **≤0.05*

Table 45. Cover (%) Forbs, Graminoids, Sub-shrubs INTAKE_01

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	2FORB	0	0	T	0	0
	ATPH	0	T	T	0	0
	ATTR	0	0	T	0	0
	CHST	0	T	0	0	0
	CLEOM2	0	0	0	0	0
	CLOB	0	T	0	0	0
	CRCI2	0	0	T	0	0
	ERIAS	0	T	0	0	0
	ERIOG	0	T	0	0	0
	ERMA2	0	0	T	0	0
	MEAL6	0	0	T	0	0
Perennial Forb	MACA2	0	0	0	0	0
	MALAC3	0	0	T	0	0
	STEPH	0	1	T	0	0
	SUMO	T	1	0	0	0
Perennial Graminoid	DISP	3	3	2	2	1
	JUBA	T	1	T	T	T
	SPAI	14	17	13	14	5
Nonnative Species	BAHY	0	0	0	0	T
	BRTE	0	0	T	0	0
	POMO5	0	T	0	0	0
	BRRU2	0	0	0	0	T

Table 46. Cover (%) Shrubs INTAKE_01

Species	2003	2004	2007	2009
ATCO	1.1	0.9	0.9	0.8
ATTO	0.8	1.3	1.6	1.0
ERNA10	1.2	3.6	3.5	4.5
SAVE4	0.0	0.0	0.3	0.2
SUMO	0.0	0.0	0.0	0.1
Total	3.1	5.8	6.3	6.5

Table 47. Ground Cover (%) INTAKE_01

Substrate	2002	2003	2004	2007	2009
Bare Soil	62	62	62	52	61
Dung	2	2	1	2	1
Litter	32	28	32	44	38
Rock	T	0	0	T	0
Standing Dead	0	0	3	2	1

Table 48. Shrub Densities and Age Classes INTAKE_01

	ATCO					ATPO	ATTO				
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2003**	**2002**	**2003**	**2004**	**2007**	**2009**
Seedling	0	8	2	1	0	0	0	8	0	0	0
Juvenile	2	21	33	12	0	0	0	3	0	0	0
Mature	1	2	10	26	35	1	0	4	3	1	5
Decadent	1	0	0	7	0	1	2	0	2	3	0
Total	4	31	45	46	35	2	2	15	5	4	5

Table 48. continued.

	ERNA10					SAVE4					SUMO			
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2002**	**2003**	**2004**	**2007**	**2009**	**2003**	**2004**	**2007**	**2009**
Seedling	2	7	0	0	0	0	0	0	0	0	1	0	0	0
Juvenile	10	12	14	1	0	2	2	3	0	0	0	3	1	0
Mature	4	16	25	9	22	0	0	0	2	3	0	0	0	2
Decadent	5	0	0	24	8	0	0	0	1	0	0	0	1	0
Total	21	35	39	34	30	2	2	3	3	3	1	3	2	2

Irrigated Pastures

There are no irrigated pastures on the Twin Lakes Lease.

Stock Water Sites

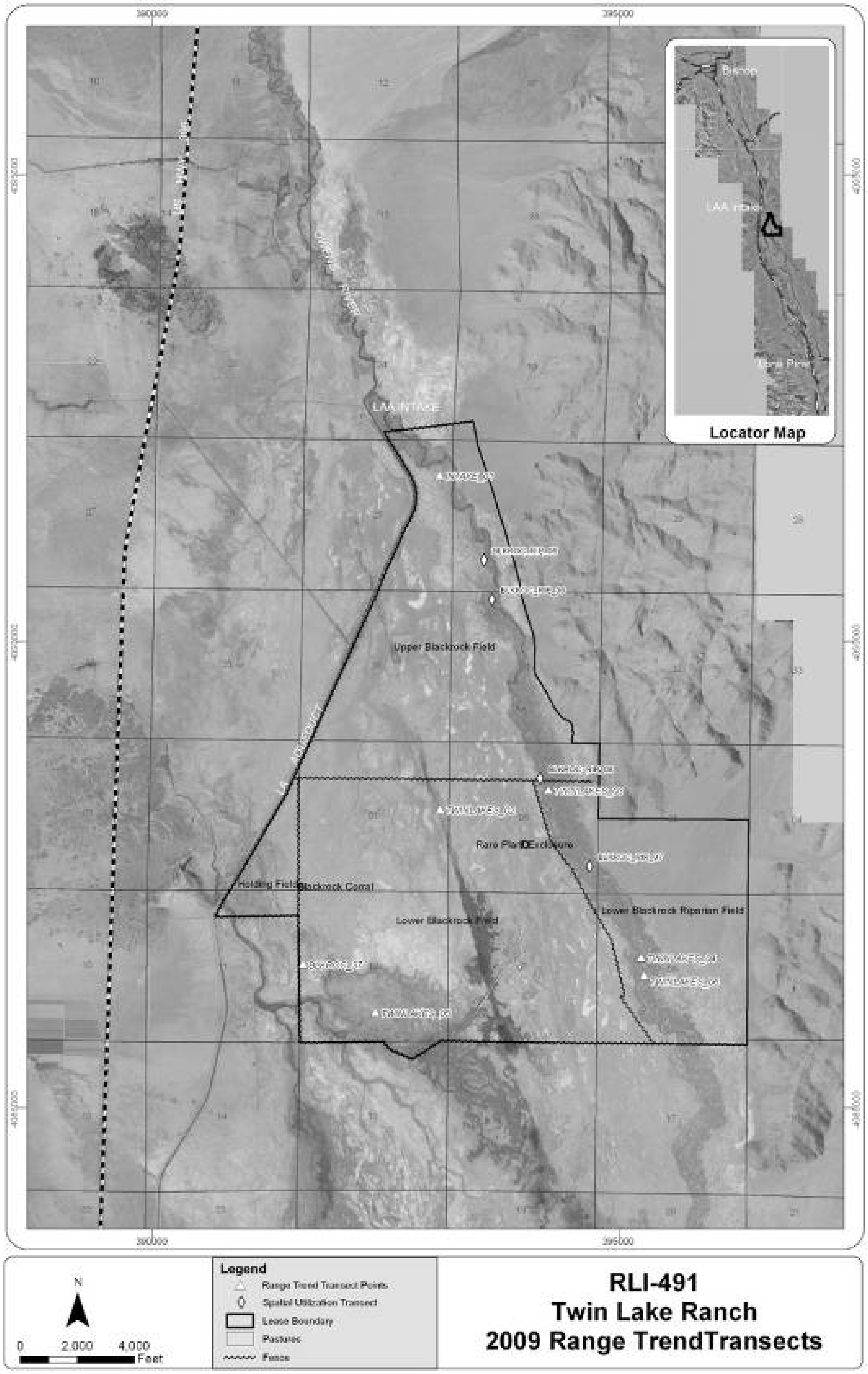
There are no identified water sites needed for the pastures.

Fencing

Fencing on the Twin Lakes Lease is completed. The only remaining project was to repair an existing 0.25-acre rare plant exclosure for Nevada oryctes (*Oryctes nevadensis*). This work was completed in early January 2009. In late January a control burn on the lease jumped its fire breaks destroying the 1.5 miles of boundary fence between the Twin Lakes and Blackrock Leases was destroyed. In February the fence was replaced by LADWP.

Burning

The prescribed range burn of the Drew Unit took place in January of 2009. It burned a total of 309 acres and removed a large amount of old growth shrubs (rabbitbrush and Nevada saltbush) that had dominated the previously meadow/slough area since late 1970. The Drew Unit began to receive water in mid-April under management guidelines for BWMA vegetation (perennial grasses, rushes, and sedges) quickly revegetated the area. The burn will provide waterfowl habitat and increase the amount of available grazing forage for the lessee in 2010.



Land Use Figure 2. Twin Lake Lease RLI-491, Range Trend Transect Locations

6.7.3. Blackrock Lease (RLI-428)

The Blackrock Lease is a cow/calf operation consisting of 32,674 acres divided into 24 management units or pastures. The lease is the largest LADWP grazing lease within the LORP area. The pastures/leases on the Blackrock Lease provide eight months of fall through spring grazing, which can begin any time after 60 continuous days of rest. A normal grazing season begins in early to mid-October and ends in mid-May or June.

There are twenty pastures on the Blackrock Lakes lease within the LORP boundary: South Blackrock Holding, White Meadow Field, White Meadow Riparian Field, Reservation Field, Reservation Riparian Field, Little Robinson Field, Robinson Field, East Robinson Field, North Riparian Field, Russell Field, Locust Field, East Russell Field, South Riparian Field, West Field, Wrinkle Field, Wrinkle Riparian Field, Spring Field, Wrinkle Holding, Horse Holding, and North Blackrock Holding. Twelve of these pastures are monitored using range trend and utilization. The other eight pastures are holding pastures for cattle processing or parts of the actual operating facilities.

Summary of Utilization

The following tables present the summarized utilization data for each pasture, for the transects in each pasture, and by species for each transect for the current year.

Table 1. End of Grazing Season Utilization for Pastures on the Blackrock Lease, RLI-428, 2009

North Riparian Field*	23%
South Riparian Field*	29%
White Meadow Riparian Field*	64%
Wrinkle Riparian Field*	27%
Horse Holding	20%
Locust Field	17%
Reservation Field	39%
Reservation Riparian Field*	NA
Robinson Pasture	17%
Russell Field	15%
White Meadow Field	28%
Wrinkle Field	31%

**Riparian pastures (40% utilization standard)*

Table 2. End of Grazing Season Utilization for Transects on the Blackrock Lease, RLI-428, 2009

North Riparian Field*	BLKROC_12	7%
	BLKROC_22	36%
	BLKROC_13	26%
	SOUTHRIP_03	7%
South Riparian Field*	BLKROC_23	38%
White Meadow Riparian Field*	BLKROC_11	64%
Wrinkle Riparian Field*	BLKROC_18	39%
	BLKROC_19	14%
	BLKROC_20	31%
	BLKROC_21	24%
Horse Holding	BLKROC_09	5%
Springer Field	HORSEHOLD_02	36%
Locust Field	BLKROC_06	17%
Reservation Field	BLKROC_02	42%
	BLKROC_03	52%
	BLKROC_44	47%
	BLKROC_49	13%
	BLKROC_51	49%
	RESERVATION_06	29%
Robinson Pasture	BLKROC_04	17%
	ROBINSON_02	17%
Russell Field	BLKROC_05	15%
	RUSSELL_02	15%
White Meadow Field	BLKROC_01	10%
	BLKROC_39	9%
	WHITEMEADOW_03	39%
	WHITEMEADOW_04	9%
	WHITEMEADOW_05	39%
Wrinkle Field	BLKROC_07	26%
	WRINKLE_02	45%
	WRINKLE_03	21%

**Riparian pastures (40% utilization standard)*

Table 3. Utilization at Each Transect at the Species Level, Blackrock Lease, End of Grazing Season, 2009

Pasture	Transect	DISP	LETR5	SPAI
North Riparian Field	BLKROC_12	7%		
	BLKROC_22	31%		61%
	BLKROC_13	33%	62%	12%
	SOUTHRIP_03	6%	9%	
South Riparian Field	BLKROC_23	47%		24%
White Meadow Riparian Field	BLKROC_11	64%		65%
Wrinkle Riparian Field	BLKROC_18	40%		37%
	BLKROC_19	16%		7%
	BLKROC_20	29%	42%	14%
	BLKROC_21	24%		
Horse Holding	HORSEHOLD_02	32%		41%
	BLKROC_09	9%		2%
Locust Field	BLKROC_06	13%		20%
Reservation Field	BLKROC_02	12%		54%
	BLKROC_03	41%		56%
	BLKROC_44	34%		66%
	BLKROC_49	10%		19%
	BLKROC_51	26%		78%
	RESERVATION_06	29%		
Robinson Field	BLKROC_04	16%	27%	
	ROBINSON_02	15%		23%
Russell Field	BLKROC_05	15%		15%
	RUSSELL_02	11%		18%
White Meadow Field	BLKROC_01	11%		0%
	BLKROC_39	9%		
	WHITEMEADOW_03	14%		52%
	WHITEMEADOW_04	9%		
	WHITEMEADOW_05	38%		40%
Wrinkle Field	BLKROC_07	21%		31%
	WRINKLE_02	40%		49%
	WRINKLE_03	23%		20%

Riparian Management Area

With the exception of the White Meadow Riparian Field (64%) all other pastures on the lease were within the targeted 40% utilization prescription for the riparian pastures on the Blackrock Lease. Portions of the White Meadow and Reservation Riparian Fields were burned in the winter of 2007 to remove salt cedar slash. The hot winter fires removed all vegetation including the small amount of existing perennial grasses and facilitated an invasion of the large, weedy annual, fivehorn smotherweed (*Bassia hyssopifolia*) across much of the floodplains in the White Meadow Riparian and Reservation Riparian Fields.

In September 2008 there were not enough perennial grasses present to adequately measure plant heights for the end of the growing season with the exception of BLKROC_11 in the White Meadow Riparian Field. Livestock use in the White Meadow Riparian Field has begun to trample the smotherweed and overtime the areas are expected to be replaced by perennial shrubs and grasses. BLKROC_11 actually showed higher amounts of grass recruitment compared to the adjacent grazing exclosure because of livestock trampling and brush clearing activities while constructing the fenced exclosure. Current saltgrass heights for this spring averaged 16.5 centimeters, indicating good plant vigor for the site.

While mapping the wetted extent from the seasonal habitat flows in early June there was a marked difference in perennial grass abundance and decreased standing dead *Bassia hyssopifolia* between the burned portions of the riparian pasture on the Blackrock Lease when compared to the burned riparian pasture on the Thibaut Lease which is currently being excluded from livestock. This difference can be explained in part by livestock trampling of dead bassia. The LADWP Watershed Resources group discussed burning the riparian corridor of the Blackrock Lease in order to remove the huge amounts of standing dead bassia as typical decomposition rates are slow, given the limited amount of precipitation on the valley floor. We decided to rule out fire as it would likely 'reset' the system, promoting for a second time a large infestation of bassia and other unwanted annual forbs. The beneficial results, last winter, from direct placement of cattle onto these bassia sites in reducing the amount of standing dead litter which is shading out the understory and limiting the spread of desirable perennial vegetation outweighs the potential risks from exceeding existing utilization guidelines. Therefore we have supported the lessees actions to reduce bassia litter through concentrated hoof action. To facilitate his efforts; we will not expect compliance with current utilization guidelines for the White Meadow Riparian Field for this upcoming year.

Upland Management Areas

Upland sites were all utilized well below the targeted 65% with use ranging from 39% in Reservation Field and 15% in the Russell Field.

2010 Grazing Season

The following table presents targeted stubble heights (in inches) by species for the 2010 grazing season. These measurements are intended to be used throughout the grazing season to help gauge the utilization on the lease. The 2010 not-to-exceed stubble height is based on the ungrazed height of key forage species on the lease.

Table 4. Target Stubble Heights (inches) for Key Species by Pasture, Blackrock Lease

Pasture	DISP	LETR5	SPAI
North Riparian Field	3		7
South Riparian Field	3	8.5	6
White Meadow Riparian Field	na		na
Wrinkle Riparian Field	2		4
Horse Holding	2		2
Locust Field	2		3
Reservation Field	2		3
Robinson Field	2	5	2
Russell Field	2		5
White Meadow Field	2		3
Wrinkle Field	2		4

Summary of Range Trend Data and Condition Blackrock Lease

There are twenty-six range trend sites on the Blackrock Lease. Monitoring site photos are presented in Appendix 3 – Section 3. Fourteen are located on Moist Floodplain ecological sites. Six of these sites are located along the historical 'dry reach' of the river (BLKROC_10,11,14,15,16,and 17). The similarity index for these six sites ranged between 4-47% averaged across all sampling periods.

BLKROC_11 averaged 47% across the entire baseline period indicating the site is in fair condition. All other sites in the former dry reach averaged less than 20%, indicating the sites are in poor condition. The similarity index for BLKROC_11 is higher due to persistence of perennial grasses at the site. At other dry reach sites, there was a loss of perennial grasses on the floodplain through Aqueduct diversions.

The similarity indices for Moist Floodplain sites, which were not dried by Aqueduct diversions, have historically received perennial flow ranged from 45-80%. Similarity indices for the eight sites located on Saline Meadow ecological sites ranged from 10-86%. With the exception of BLKROC_01 and BLKROC_02, the remaining six sites were in good to excellent condition. The three range trend sites on Sodic Fan, BLKROC_09, BLKROC_51, and BLKROC_44, have been in good condition while the one Sandy Terrace site BLKROC_49, is in fair condition.

Significant changes in 2009 frequency beyond what had previously been observed during the baseline period occurred on seven of the 25 sites. BLKROC_01 frequency dropped for Nevada saltbush while rubber rabbitbrush significantly increased on BLKROC_03. The combination of increasing shrubs with an intact perennial grass component on BLKROC_03 makes the site a logical area for a prescribed burn. Significant departures in plant frequency on the historical dry reach section indicated that the area remains a shrub dominated community with an increase in Nevada Saltbush on BLKROC_10, an increase in inkweed on BLKROC_11, a decrease insaltgrass on BLKROC_15, and an increase in fivehorn smotherweed on BLKROC_16. A significant spike in creeping wildrye frequency occurred on BLKROC_20. In general sites have remained relatively stable through the baseline period and initial LORP implementation phase. Utilization has been at or below the maximum allowable upland and riparian pastures.

Table 5. Similarity Indices During Baseline Period with Mean Value for Each Transect

Moist Flood Plain	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**MEAN**
BLKROC_10*	6%	25%	17%			14%	16%
BLKROC_11*	64%	46%	36%			40%	47%
BLKROC_12	63%	63%	63%			65%	64%
BLKROC_13	83%	79%	83%			76%	80%
BLKROC_14*		9%	8%			25%	14%
BLKROC_15*	11%	9%	11%			8%	10%
BLKROC_16*		10%	10%	10%		6%	9%
BLKROC_17*		5%	4%	5%		3%	4%
BLKROC_18		66%	75%	65%		53%	65%
BLKROC_19		75%	71%	79%		76%	75%
BLKROC_20		69%	71%	74%		63%	69%
BLKROC_21		58%	67%	65%		61%	63%
BLKROC_22					57%	57%	45%
BLKROC_23					79%	78%	79%
SALINE MEADOW	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**MEAN**
BLKROC_01	16%	6%	12%			5%	10%
BLKROC_02	55%	33%	28%			42%	40%
BLKROC_03	68%	72%	64%			63%	67%
BLKROC_04	66%	65%	52%			74%	64%
BLKROC_05	88%	84%	75%			87%	84%
BLKROC_06	73%	73%	82%			85%	78%
BLKROC_07	79%	81%	90%			93%	86%
BLKROC_39	63%	55%	62%			64%	61%
SODIC FAN	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**MEAN**
BLKROC_51	46%	78%	62%			66%	63%
BLKROC_09	82%	79%				56%	73%
BLKROC_44	87%	81%	77%			62%	77%
SANDY TERRACE	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**MEAN**
BLKROC_49	14%	29%	34%			38%	29%

**Sites located along historical dry reach*

Description of Condition and Trend by Monitoring Transect

BLKROC_01

BLKROC_01 is located on an upland site in the White Meadow Field. The soils are mapped as the Division-Numu Complex, 0-2% slopes soil series, which corresponds to a Saline Meadow ecological site. The similarity index at the monitoring site has ranged between 12-18% during the baseline period. Herbaceous production for the site is much lower than potential, while shrub production is much higher than typical for a Saline Meadow site at its potential. In 1968-69 this entire area was scraped to store runoff. This type of activity significantly altered the area's ability to resemble a Saline Meadow in high ecological condition. Frequency trend was static in 2009 when compared to baseline years with the exception of the appearance of verrucose seapurslane (*Sesuvium verrucosum* [SEVE2]). Utilization has been minimal on the site during the three years of sampling.

Table 6. Blackrock_01 Comparison to Saline Bottom Ecological Site Baseline Conditions

Ecological Site: Saline Bottom		**% Composition by Weight**				
Functional Group	Species	Site Potential	2002	2003	2004	2007
Annual Forbs	AAFF	Trace to 2%				
Perennial Forbs	ASLE8	0-2%				
	CASTI	0-2%				
	STEPH	0-2%				
Other Perennial Forbs		0-2%	5% (2)	1%	1%	1%
Perennial Graminoids	SPAI	25-45%				
	DISP	10-20%	11%	4%	7%	3%
	LECI	5-10%				
	JUBA	0-2%	5% (2)	2%	5% (2)	2%
	POSE	0-2%				
	ORHY	0-2%				
Other Perennial Graminoids		0-2%				
Shrubs	SAVE4	5-15%				
	ATCO	5-10%				
	ATPA3	2-5%				
	MACA17	0-3%				
	ERNA10	0-3%		56% (3)	61% (3)	52% (3)
	TEGL	0-3%				
	ATTO	0-3%	79% (3)	37% (3)	25% (3)	42% (3)
	ARTRW8	0-3%				
	SUMO	0-3%				
Other Shrubs		0-5%				
Nonnative Species		0%				
Total Forbs		10%	5%	1%	1%	0%
Total Perennial Graminoids		65%	16%	6%	12%	5%
Total Shrubs		25%	79%	93%	87%	95%
Total Nonnative Species		0%	0%	0%	0%	0%
Similarity Index			18%	13%	16%	12%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 7. Utilization, Weighted Average, BLKROC_01

2007	**2008**	**2009**
13%	8%	10%

Table 8. Utilization by Species, BLKROC_01

	DISP	**SPAI**
2007	10%	46%
2008	8%	
2009	11%	

Table 9. Frequency (%), BLKROC_01

Life Forms	Species	2002	2003	2004	2007	2009
Perennial Forb	HECU3	7	4	8	2	16*
	MALE3	20	26	21	26	21
	PYRA	0	3	2	1	0
	SEVE2	0	0	0	0	16**
Perennial Graminoid	DISP	39	59	69	52	57
	JUBA	27	39	35	24	21
	SPAI	0	4	3	4	4
Shrubs	ATTO	29	36	35	36	13**
	ERNA10	65	61	57	53	52

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 10. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_01

Life Forms	Species	2002	2003	2004	2007	2009
Perennial Forb	HECU3	T	T	T	T	T
	MALE3	T	T	T	T	T
	PYRA	0	T	T	T	0
	SEVE2	0	0	0	0	T
Perennial Graminoid	DISP	1	2	1	1	1
	JUBA	T	1	1	1	T
	SPAI	0	T	T	T	T

Table 11. Cover (m) Shrubs BLKROC_01

Species	2003	2004	2007	2009
ATTO	12.6	3.5	12.2	3.8
ERNA10	26.1	11.4	20.6	10.5
Total	38.7	14.8	32.7	14.3

Table 12. Ground Cover (%) BLKROC_01

Substrate	2002	2003	2004	2007	2009
Bare Soil	71	66	83	81	86
Dung	1	1	1	1	1
Litter	30	31	16	18	14
Rock	0	0	0	0	0
Standing Dead	0	0	6	12	17

Table 13. Shrub Densities and Age Classes BLKROC_01

	ATTO					ERNA10				
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2002**	**2003**	**2004**	**2007**	**2009**
Seedling	3	0	1	0	2	6	6	2	0	2
Juvenile	8	11	8	5	1	9	39	29	18	15
Mature	9	29	23	11	17	25	84	77	33	53
Decadent	1	3	3	11	10	11	22	27	45	27
Total	21	43	35	27	30	51	151	135	96	97

BLKROC_02

BLKROC_02 is located in the Reservation Field, which is designated as an upland pasture. The soils are mapped as Manzanar-Winnedumah Association, 0-2% slopes soil series, which corresponds to the Saline Meadow ecological site. The similarity index has varied widely during the baseline period from between 28-55%, largely because of fluctuations in alkali sacaton production. The site is dominated by shrubs and may not be able to reach site potential unless shrub densities are reduced. There was no significant change in frequency in 2009 when compared 2007. Nevada saltbush densities increased in 2003 and 2004 during a large germination event of seedlings, subsequent years indicate that survivability was low; however, total density has remained greater than 2002. Cover has remained static since 2003. Although this may seem incongruous, canopy cover is measured at the top most level and does not sample for additional plants of the same species beneath the upper canopy, therefore seedlings at the base of parent plants would remain undetected. Utilization has remained within the 65% utilization standard for upland pastures from 2007 to 2009.

Table14. Blackrock_02 Comparison to Saline Meadow Ecological Site

Ecological Site: Saline Meadow		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%				
Perennial Forbs	ANCA10	0-2%				
	CALI4	0-2%				
	PYRA	0-2%				
Other Perennial Forbs		0-2%	4% (2)		1%	3% (2)
Perennial Graminoids	DISP	25-50%	7%	4%	3%	8%
	SPAI	25-50%	41%	17%	12%	22%
	JUBA	5-15%	T	T	1%	T
	LETR5	5-10%				
	CAREX	0-2%				
	POSE	0-2%				
	LECI	0-2%		4% (2)	1%	
Other Perennial Graminoids		0-2%				
Shrubs	ATTO	0-5%	49% (5)	63% (5)	30% (5)	55% (5)
	ERNA10	0-5%		12% (5)	53% (5)	10% (5)
	ROWO	0-5%				
	SALIX	0-5%				
	SAVE4	0-5%				
Other Shrubs		0-5%				
Trees	SAGO	0-10%				
	POFR2	0-5%				
Nonnative Species		0%				
Total Forbs		5%	4%	0%	1%	3%
Total Perennial Graminoids		80%	48%	25%	16%	31%
Total Shrubs		5-15%	49%	75%	82%	66%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	0%	0%
Similarity Index			55%	33%	28%	42%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 15. Utilization, Weighted Average, BLKROC_02

2007	2008	2009
64%	30%	42%

Table 16. Utilization by Species, BLKROC_02

	DISP	SPAI
2007	53%	71%
2008	26%	33%

Table 17. Frequency (%), BLKROC_02

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATTR	0	3	0	0	0
Perennial Forb	GLLE3	7	2	5	4	7
Perennial Graminoid	DISP	53	49	55	49	55
	JUBA	3	11	6	6	4
	LECI4	0	4	1	2	2
	SPAI	71	95	92	91	86
Shrubs	ATTO	43	35	41	30	27
	ERNA10	12	27	13	16	22
Nonnative	BAHY	0	5	0	0	0
	SATR12	0	0	1	0	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 18. Cover (%)Forbs, Graminoids, Sub-shrubs BLKROC_02

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATTR	0	0	0	0	0
Perennial Forb	GLLE3	1	T	1	1	1
Perennial Graminoid	DISP	1	2	1	2	1
	JUBA	T	T	T	T	T
	LECI4	0	2	T	T	T
	SPAI	9	9	7	9	5
Nonnative	BAHY	0	0	0	0	0
	SATR12	0	0	T	0	0

Table 19. Cover (m) Shrubs BLKROC_02

Species	2003	2004	2007	2009
ATTO	22.3	10.3	13.4	9.7
ERNA10	6.0	25.1	3.4	6.4
Total	28.3	35.4	16.9	16.1

Table 20. Ground Cover (%) BLKROC_02

Substrate	2002	2003	2004	2007	2009
Bare Soil	58	42	63	47	53
Dung	1	1	1	1	1
Litter	41	48	32	52	46
Rock	0	2	0	0	0
Standing Dead	0	0	5	8	13

Table 21. Shrub Densities and Age Classes BLKROC_02

	ATTO					ERNA10				
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2002**	**2003**	**2004**	**2007**	**2009**
Seedling	3	212	93	0	0	0	7	5	0	0
Juvenile	7	10	83	4	19	1	6	2	1	0
Mature	5	23	26	21	19	3	5	8	6	8
Decadent	8	5	2	10	14	2	5	2	3	5
Total	23	250	204	35	52	6	23	17	10	13

BLKROC_03

BLKROC_03 is located in the Reservation Field on the Shondow Loam 0-2% slopes soil series. The transect is on a Saline Meadow ecological site in an upland pasture. The site has ranged between 63-72% similarity to the site's potential, placing the area in good to excellent condition. The site produces large quantities of alkali sacaton. Following 2007, utilization has remained below the 65% standard for upland pastures. Frequency results indicate the site has been stable over the past five monitoring periods with the exception of an increase in rubber rabbitbrush. Increases in frequency, cover, and density for rubber rabbitbrush has markedly risen during the past two sampling periods. Because this site is experiencing an increase in shrub abundance while maintaining high grass cover, this area should be considered a candidate for a prescribed burn in the near future before sacaton cover starts to be replaced by even greater amounts of rubber rabbitbrush. Presently, the site is in excellent condition but not stable due to the rising abundance of woody species.

Table 22. Blackrock_03 Comparison to Saline Meadow Ecological Site

Ecological Site: Saline Meadow		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%		3%		
Perennial Forbs	ANCA10	0-2%				
	CALI4	0-2%				
	PYRA	0-2%				
Other Perennial Forbs		0-2%				T
Perennial Graminoids	DISP	25-50%	18%	16%	9%	7%
	SPAI	25-50%	82% (50)	78% (50)	85% (50)	83% (50)
	JUBA	5-15%				
	LETR5	5-10%				
	CAREX	0-2%				
	POSE	0-2%				
	LECI	0-2%				
Other Perennial Graminoids		0-2%				T
Shrubs	ATTO	0-5%				1%
	ERNA10	0-5%		3%	6% (5)	9% (5)
	ROWO	0-5%				
	SALIX	0-5%				
	SAVE4	0-5%				
Other Shrubs		0-5%				
Trees	SAGO	0-10%				
	POFR2	0-5%				
Nonnative Species		0%		1%		
Total Forbs		5%	0%	3%	0%	0%
Total Perennial Graminoids		80%	100%	94%	94%	90%
Total Shrubs		5-15%	0%	3%	6%	9%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	0%	0%
Similarity Index			68%	72%	64%	63%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 23. Utilization, Weighted Average, BLKROC_03

2007	2008	2009
74%	43%	52%

Table 24. Utilization by Species, BLKROC_03

	DISP	SPAI
2007	71%	76%
2008	23%	63%
2009	41%	56%

Table 25. Frequency (%), BLKROC_03

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	CHHI	0	18	6	0	0
Perennial Forb	GLLE3	0	0	0	0	1
Perennial Graminoid	ARPU9	0	0	0	2	0
	DISP	53	47	59	42	36
	JUBA	0	0	0	0	2
	SPAI	100	112	117	122	128
Shrubs	ATTO	0	0	0	1	2
	ERNA10	0	6	7	4	17*
Nonnative	LASE	0	3	3	0	0
	POMO5	0	2	0	0	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 26. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_03

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	CHHI	0	2	T	0	0
Perennial Forb	GLLE3	0	0	0	T	T
Perennial Graminoid	ARPU9	0	0	0	T	0
	DISP	5	7	2	3	1
	JUBA	0	0	0	0	T
	SPAI	35	49	23	58	31
Nonnative Species	LASE	0	T	T	0	0
	POMO5	0	T	0	0	0

Table 27. Cover (m) Shrubs BLKROC_03

Species	2003	2004	2007	2009
ATTO	0.0	0.0	0.3	0.0
ERNA10	1.5	1.3	5.3	9.5
Total	1.5	1.3	5.6	9.5

Table 28. Ground Cover (%)BLKROC_03

Substrate	2002	2003	2004	2007	2009
Bare Soil	35	26	44	34	25
Dung	2	1	1	3	1
Litter	58	50	38	64	74
Rock	0	0	0	0	0
Standing Dead	0	0	0	0	0

Table 29. Shrub Densities and Age Classes BLKROC_03

	ATTO		ERNA10				
Age Class	**2007**	**2009**	**2002**	**2003**	**2004**	**2007**	**2009**
Seedling	0	0	0	11	0	0	0
Juvenile	0	0	0	0	9	26	13
Mature	2	2	1	3	3	36	48
Decadent	0	0	0	0	0	1	0
Total	2	2	1	14	12	63	61

BLKROC_04

BLKROC_04 is located on an upland site within the Robinson Pasture. The soil series is Manzanar Silt Loam, 0-2% slopes and is a Saline Meadow ecological site. Similarity index during the baseline period ranged between 52-74%. The site has a high diversity of perennial grasses and low shrub composition. Baltic rush and creeping wildrye frequency significantly increased while alkali sacaton significantly decreased in 2009 when compared to 2007, neither of these changes were significantly different from baseline sampling ranges. During the last two years utilization has been below the upland standard of 65%.

Table 30. BLKROC_04 Comparison to Saline Meadow Ecological Site

Ecological Site: Saline Meadow		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%		4%		T
Perennial Forbs	ANCA10	0-2%	11% (2)	17% (2)	24% (2)	20% (2)
	CALI4	0-2%				
	PYRA	0-2%	26% (2)	12% (2)	7% (2)	7% (2)
Other Perennial Forbs		0-2%	2%		1%	1%
Perennial Graminoids	DISP	25-50%	16%	15%	9%	21%
	SPAI	25-50%	27%	12%	16%	20%
	JUBA	5-15%	11%	23% (15)	34% (15)	16% (15)
	LETR5	5-10%	3%	9%	3%	8%
	CAREX	0-2%	1%	T		
	POSE	0-2%				
	LECI	0-2%				
Other Perennial Graminoids		0-2%				
Shrubs	ATTO	0-5%		1%		
	ERNA10	0-5%		5%	5%	8% (5)
	ROWO	0-5%				
	SALIX	0-5%				
	SAVE4	0-5%				
Other Shrubs		0-5%	2%			
Trees	SAGO	0-10%				
	POFR2	0-5%				
Nonnative Species		0%		2%		
Total Forbs		5%	39%	33%	32%	27%
Total Perennial Graminoids		80%	58%	60%	62%	65%
Total Shrubs		5-15%	2%	5%	5%	8%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	2%	0%	0%
Similarity Index			66%	65%	52%	74%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 31. Utilization, weighted average, BLKROC_04

2007	**2008**	**2009**
68%	58%	17%

Table 32. Utilization by Species, BLKROC_04

	DISP	LETR5	SPAI
2007	56%	77%	83%
2008	42%		75%
2009	16%	27%	

Table 33. Frequency (%), BLKROC_04

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	CHHI	0	2	0	0	0
	COMAC	0	23	0	0	0
	HEAN3	0	8	0	4	6
Perennial Forb	ANCA10	12	18	17	22	22
	HECU3	0	0	0	1	3
	MALE3	14	3	8	10	1**
	PYRA	41	50	44	23	28
Perennial Graminoid	CADO2	5	18	0	5	0
	CAREX	0	0	0	0	14
	DISP	83	77	70	76	62
	JUBA	88	113	93	73	95**
	LETR5	27	65	43	48	70**
	SPAI	70	30	73	59	27**
Shrubs	ALOC2	5	0	0	0	2
	ATTO	0	5	0	0	4
	ERNA10	0	3	2	2	3
Nonnative	BAHY	0	12	6	0	20*
	POMO5	0	2	0	0	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 34. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_04

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	CHHI	0	T	0	0	0
	COMAC	0	2	0	0	0
	HEAN3	0	T	0	T	T
Perennial Forb	ANCA10	2	7	7	8	7
	HECU3	0	0	0	T	T
	MALE3	1	T	T	1	T
	PYRA	7	7	3	4	2
Perennial Graminoid	CADO2	T	T	0	T	0
	CAREX	0	0	0	0	1
	DISP	4	9	4	11	4
	JUBA	3	13	14	9	4
	LETR5	1	6	1	4	7
	SPAI	11	10	10	16	4
Nonnative	BAHY	0	1	T	0	1
	POMO5	0	T	0	0	0

Table 35. Cover (m) Shrubs BLKROC_04

Species	2003	2004	2007	2009
ATTO	0.3	0.0	0.0	0.7
ERNA10	3.4	2.8	5.6	7.9
Total	3.6	2.8	5.6	8.6

Table 36. Ground Cover (%) BLKROC_04

Substrate	2002	2003	2004	2007	2009
Bare Soil	17	29	51	28	22
Dung	4	3	3	3	2
Litter	77	54	41	69	76
Rock	0	0	0	0	0
Standing Dead	0	0	0	1	1

Table 37. Shrub Densities and Age Classes BLKROC_04

	ATTO			ERNA10				
Age Class	**2002**	**2003**	**2009**	**2002**	**2003**	**2004**	**2007**	**2009**
Seedling	0	0	0	4	4	0	0	2
Juvenile	1	1	0	18	2	15	1	7
Mature	0	1	1	2	10	13	13	14
Decadent	0	0	0	0	0	0	1	1
Total	1	2	1	24	16	28	15	24

BLKROC_05

BLKROC_05 is located on an upland site in the Russell Field. The soil series is Manzanar Silt Loam, 0-2% slopes. The site is a Saline Meadow ecological site. The similarity index ranged between 75-88% during the baseline period, indicating that the site is in excellent condition. Saltgrass frequency rose significantly beyond baseline parameters in 2009 however saltgrass cover decreased. All other attributes have remained static. Shrub (rubber rabbitbrush) cover and density at the study plot has shown a gradual decline. Utilization exceeds 65% in 2007, during the past two years use has been well below the upland pasture standard of 65%.

Table 38. Blackrock_05 Comparison to Saline Meadow Ecological Site

Ecological Site: Saline Meadow		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%	1%	4%		T
Perennial Forbs	ANCA10	0-2%				
	CALI4	0-2%				
	PYRA	0-2%	115 (2)%	9% (2)	6% (2)	T
Other Perennial Forbs		0-2%				
Perennial Graminoids	DISP	25-50%	34%	22%	14%	32%
	SPAI	25-50%	54% (50)	54% (50)	63% (50)	63% (50)
	JUBA	5-15%	1%	1%	4%	2%
	LETR5	5-10%				
	CAREX	0-2%				
	POSE	0-2%				
	LECI	0-2%				
Other Perennial Graminoids		0-2%				
Shrubs	ATTO	0-5%				
	ERNA10	0-5%		10% (5)	14% (5)	3%
	ROWO	0-5%				
	SALIX	0-5%				
	SAVE4	0-5%				
Other Shrubs		0-5%				
Trees	SAGO	0-10%				
	POFR2	0-5%				
Nonnative Species		0%				1%
Total Forbs		5%	11%	13%	6%	0%
Total Perennial Graminoids		80%	89%	77%	81%	96%
Total Shrubs		5-15%	0%	10%	14%	3%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	0%	1%
Similarity Index			88%	84%	75%	87%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 39. Utilization, Weighted Average, BLKROC_05

2007	**2008**	**2009**
77%	41%	15%

Table 40. Utilization by Species, BLKROC_05

	DISP	SPAI
2007	73%	80%
2008	25%	57%
2009	15%	15%

Table 41. Frequency (%), BLKROC_05

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATPH	0	3	0	0	0
	ATSES	0	11	0	2	0
	CLEOM2	0	16	0	0	0
	COMAC	0	17	0	3	0
	HEAN3	3	11	0	6	0
Perennial Forb	PYRA	32	45	37	5	8
	SICO2	0	2	0	0	0
Perennial Graminoid	DISP	49	63	49	49	78**
	JUBA	7	14	14	10	10
	LECI4	0	0	0	0	4
	SPAI	124	125	115	123	111
Shrubs	ATTO	0	2	0	0	0
	ERNA10	7	4	1	0	1
Nonnative	BAHY	0	0	0	11	3
	POMO5	0	4	0	0	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 42. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_05

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATPH	0	0	0	0	0
	ATSES	0	1	0	T	0
	CLEOM2	0	1	0	0	0
	COMAC	0	1	0	T	0
	HEAN3	1	1	0	T	0
Perennial Forb	PYRA	4	5	2	T	T
	SICO2	0	T	0	0	0
Perennial Graminoid	DISP	12	13	5	20	6
	JUBA	T	1	2	1	T
	LECI4	0	0	0	0	T
	SPAI	30	47	33	58	21
Nonnative	BAHY	0	0	0	T	T
	POMO5	0	T	0	0	0

Table 43. Cover (m) Shrubs BLKROC_05

Species	2003	2004	2007	2009
ERNA10	7.6	6.3	2.1	0.8
Total	7.6	6.3	2.1	0.8

Table 44. Ground Cover (%)BLKROC_05

Substrate	2002	2003	2004	2007	2009
Bare Soil	22	14	32	7	19
Dung	4	1	1	3	2
Litter	68	63	57	88	79
Rock	0	0	0	2	0
Standing Dead	0	0	0	0	1

Table 45. Shrub Densities and Age Classes BLKROC_05

	ERNA10				
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**
Juvenile	1	3	4	0	0
Mature	4	11	9	1	1
Decadent	0	0	0	2	2
Total	5	14	13	3	3

BLKROC_06

BLKROC_06 is located on an upland site in the Locust Field. The soil series is Manzanar Silt Loam, 0-2% slopes and the ecological site is a Saline Meadow. The similarity index ranged between 73-85% during the baseline sampling period indicating the site is in excellent condition. Utilization during the past three years utilization was within upland utilization standards, with minimal use during the last two years. Baltic rush decreased significantly in 2009 as compared to 2007 but did not significantly range beyond baseline ranges. Rubber rabbitbrush densities rose precipitously in 2003. LADWP Watershed Staff have noted a high abundance of young rubber rabbitbrush in the general area, placing the site as a candidate for a maintenance burn. Given current conditions, a light to moderate intensity burn would effectively eliminate the increasing amount of juvenile shrubs. The lessee conducted a burn close to BLKROC_06 in spring 2009. By June the burned area had already recovered with substantial perennial grass regrowth. This result further supports the idea that the area would positively benefit from a moderate intensity burn.

Table 46. Blackrock_06 Comparison to Saline Meadow Ecological Site

Ecological Site: Saline Meadow		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%		14% (2)		
Perennial Forbs	ANCA10	0-2%	17% (2)	2%	6% (2)	4% (2)
	CALI4	0-2%				
	PYRA	0-2%	3% (2)	1%		T
Other Perennial Forbs		0-2%				
Perennial Graminoids	DISP	25-50%	18%	15%	15%	20%
	SPAI	25-50%	61% (50)	37%	47%	50%
	JUBA	5-15%	1%	2%	7%	2%
	LETR5	5-10%				
	CAREX	0-2%				
	POSE	0-2%				
	LECI	0-2%				
Other Perennial Graminoids		0-2%				
Shrubs	ATTO	0-5%	T	6% (5)	1%	2%
	ERNA10	0-5%		22% (5)	13% (5)	18% (5)
	ROWO	0-5%				
	SALIX	0-5%	T	2%	11% (5)	4%
	SAVE4	0-5%				
Other Shrubs		0-5%				
Trees	SAGO	0-10%				
	POFR2	0-5%				
Nonnative Species		0%				
Total Forbs		5%	20%	17%	6%	4%
Total Perennial Graminoids		80%	80%	53%	69%	72%
Total Shrubs		5-15%	0%	30%	25%	24%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0.0%	0.0%	0.0%	0.0%
Similarity Index			73%	73%	82%	85%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 47. Utilization, Weighted Average, BLKROC_06

2007	2008	2009
65%	15%	17%

Table 48. Utilization by Species, BLKROC_06

	DISP	SPAI
2007	44%	82%
2008	10%	20%
2009	13%	20%

Table 49. Frequency (%), BLKROC_06

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATPH	0	30	0	0	0
	CHHI	0	8	0	0	0
	CLEOM2	0	3	0	0	0
	COMAC	0	26	0	0	0
Perennial Forb	ANCA10	5	4	4	2	4
	PYRA	19	4	0	2	1
Perennial Graminoid	DISP	73	80	75	77	66
	JUBA	17	26	37	27	13*
	SPAI	95	78	71	76	76
Shrubs	ATTO	0	8	9	4	10
	ERNA10	20	19	6	8	9
	SAEX	0	0	0	2	0

** indicates a significant difference, $\alpha<0.1$, **<0.05 compared to previous sampling period*

Table 50. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_06

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATPH	0	2	0	0	0
	CHHI	0	T	0	0	0
	CLEOM2	0	T	0	0	0
	COMAC	0	4	0	0	0
Perennial Forb	ANCA10	4	1	3	1	1
	PYRA	1	1	T	T	T
Perennial Graminoid	DISP	6	9	8	9	3
	JUBA	T	1	4	1	1
	SPAI	29	33	38	32	14

Table 51. Cover (m) Shrubs BLKROC_06

Species	2003	2004	2007	2009
ATTO	3.3	0.7	1.0	2.1
ERNA10	17.3	9.1	9.9	9.5
SAEX	2.3	7.5	3.3	0.7
SALIX	0.0	0.6	0.0	0.0
Total	23.0	18.0	14.2	12.3

Table 52. Ground Cover (%)BLKROC_06

Substrate	2002	2003	2004	2007	2009
Bare Soil	35	20	30	30	32
Dung	2	2	1	4	3
Litter	61	63	58	66	65
Rock	0	0	0	0	0
Standing Dead	0	0	12	2	3

Table 53. Shrub Densities and Age Classes BLKROC_06

	ATTO					ERNA10				
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2002**	**2003**	**2004**	**2007**	**2009**
Seedling	0	1	27	7	0	0	6	2	2	0
Juvenile	3	3	9	22	4	19	49	44	36	4
Mature	1	9	3	15	39	26	94	52	51	90
Decadent	1	1	0	1	0	2	2	20	29	25
Total	5	14	39	45	43	47	151	118	118	119

Table 53. continued.

	SALIX	SAVE4		SAEX				
Age Class	**2004**	**2002**	**2003**	**2002**	**2003**	**2004**	**2007**	**2009**
Seedling	0	0	0	0	0	0	0	0
Juvenile	2	0	0	0	3	3	3	0
Mature	0	1	1	0	13	8	10	11
Decadent	0	0	0	1	0	1	6	0
Total	2	1	1	1	16	12	19	11

BLKROC_07

BLKROC_07 is located on an upland site in the Wrinkle Field. The soil series is Manzanar Silt Loam, 0-2% slopes soil series and is a Saline Meadow ecological site. The similarity index ranged between 79-93% during the baseline sampling period indicating the site is in excellent condition. Frequency values in 2009 did not range beyond baseline parameters. Shrub cover and density appear to be stable on the site. Utilization has been within upland utilization standards.

Table 54. Blackrock_07 Comparison to Saline Meadow Ecological Site

Ecological Site: Saline Meadow		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%		16% (2)		
Perennial Forbs	ANCA10	0-2%				
	CALI4	0-2%				
	PYRA	0-2%				
Other Perennial Forbs		0-2%			2%	1%
Perennial Graminoids	DISP	25-50%	22%	24%	28%	35%
	SPAI	25-50%	70% (50)	48%	47%	55% (50)
	JUBA	5-15%	7%	2%	8%	1%
	LETR5	5-10%				
	CAREX	0-2%				
	POSE	0-2%				
	LECI	0-2%				
Other Perennial Graminoids		0-2%				
Shrubs	ATTO	0-5%	T			1%
	ERNA10	0-5%		10% (5)	14% (5)	5%
	ROWO	0-5%				
	SALIX	0-5%				
	SAVE4	0-5%				
Other Shrubs		0-5%				
Trees	SAGO	0-10%				
	POFR2	0-5%				
Nonnative Species		0%				3%
Total Forbs		5%	0%	16%	2%	1%
Total Perennial Graminoids		80%	100%	74%	84%	90%
Total Shrubs		5-15%	0%	10%	14%	6%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	0%	3%
Similarity Index			79%	81%	90%	93%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 55. Utilization, Weighted Average, BLKROC_07

2007	**2008**	**2009**
47%	27%	26%

Table 56. Utilization by Species, BLKROC_07

	DISP	SPAI
2007	42%	51%
2008	20%	34%
2009	21%	31%

Table 57. Frequency (%), BLKROC_07

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATPH	0	32	0	0	0
	CLOB	0	9	0	0	0
	ERPR4	0	0	0	3	0
Perennial Forb	SUMO	0	0	0	0	3
Perennial Graminoid	DISP	70	59	71	61	75
	JUBA	17	6	12	1	4
	SPAI	92	68	64	76	84
Shrubs	ATTO	5	0	0	0	0
	ERNA10	5	4	3	3	4
Nonnative	POMO5	0	0	0	9	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 58. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_07

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATPH	0	3	0	0	0
	CLOB	0	1	0	0	0
	ERPR4	0	0	0	T	0
Perennial Forb	SUMO	0	0	0	0	0
Perennial Graminoid	DISP	5	7	4	15	5
	JUBA	2	1	1	T	T
	SPAI	25	20	11	36	17
Nonnative	POMO5	0	0	0	2	0

Table 59. Cover (m) Shrubs BLKROC_07

Species	2003	2004	2007	2009
ATTO	0.0	0.0	0.5	0.2
ERNA10	3.6	2.9	3.0	1.9
SUMO	0.0	0.4	0.7	0.3
Total	3.6	3.2	4.2	2.3

Table 60. Ground Cover (%)BLKROC_07

Substrate	2002	2003	2004	2007	2009
Bare Soil	40	43	59	52	43
Dung	2	3	2	1	1
Litter	54	42	30	44	54
Rock	0	0	0	0	2
Standing Dead	0	0	0	3	1

Table 61. Shrub Densities and Age Classes BLKROC_07

	ATTO					ERNA10					SAVE4	SUMO			TARA
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2002**	**2003**	**2004**	**2007**	**2009**	**2004**	**2004**	**2007**	**2009**	**2007**
Seedling	0	0	0	2	0	3	1	0	0	0	0	0	0	0	7
Juvenile	1	1	2	1	0	6	8	6	2	0	1	1	4	3	0
Mature	0	2	3	1	3	4	13	15	3	5	0	3	2	3	0
Decadent	0	0	0	1	2	0	1	0	3	2	0	0	3	0	0
Total	1	3	5	5	5	13	23	21	8	7	1	4	9	6	7

BLKROC_08

Range trend monitoring was discontinued on BLKROC_8 in the 2008-09 grazing season. This transect is located on a saline meadow were surface water runs through the end of the transect. This water is used for livestock water and must be run periodically throughout the year. The decision to drop this transect as a viable range trend site was based on it receiving this supplemental water which, over time, has changed the species composition on the transect. The current location of BLKROC_8 was not an accurate representation of the other upland sites that are specific in vegetation composition and moisture for the range trend baseline study.

BLKROC_09

BLKROC_09 is located on an upland site in the Horse Holding Field, on the Winnedumah Fine Sandy Loam 0-2% slopes soil unit. The transect is located on a Sodic Fan ecological site, the similarity index for the transect ranged between 56-82% during the baseline period. The decline in similarity index occurred in response to a decline in Nevada saltbush. Based on the site description, current conditions support an excess perennial grass and not enough shrubs to reach the site's potential. Because the site is designated as a Sodic Fan it cannot include more than 20% dry weight composition for alkali sacaton and 10% dry weight composition for saltgrass. This site is a good example of where the site potential may not match up with management goals. Frequency in 2009 did not differ from the baseline period and there is no apparent change in trend in shrub cover, density or frequency on the site. Utilization on the site has been within upland standards and minimal during the last two years.

Table 62. BLKROC_09 Comparison to Sodic Fan Ecological Site

Ecological Site: Sodic Fan		**% Composition by Weight**			
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2007**
Annual Forbs	AAFF	0%		1%	
Perennial Forbs	GLLE3	0-2%	T		
Other Perennial Forbs		0-2%			T
Perennial Graminoids	SPAI	10-20%	24% (20)	17%	28% (20)
	DISP	5-10%	24% (10)	17% (10)	26% (10)
	LECI	5-10%			1%
	JUBA	0-2%	35 (2)%	3% (2)	5% (2)
Other Perennial Graminoids		0-2%	2%	1%	T
Shrubs	ATTO	40-55%	48%	46%	23%
	SAVE4	5-15%			
	ATCO	2-5%			
	ERNA10	0-2%		14% (2)	17% (2)
	ARTRW8	0-2%			
	SUMO	0-2%			
Other Shrubs		0-10%			
Nonnative Species		0%			
Total Forbs		5%	T	1%	T
Total Perennial Graminoids		25%	51%	39%	60%
Total Shrubs		70%	48%	60%	40%
Total Nonnative Species		0%	0%	0%	0%
Similarity Index			82%	79%	56%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.					

Table 63. Utilization, Weighted Average, BLKROC_09

2007	2008	2009
61%	15%	5%

Table 64. Utilization by Species, BLKROC_09

	DISP	SPAI
2007	51%	71%
2008	6%	24%
2009	9%	2%

Table 65. Frequency (%), BLKROC_09

Life Forms	Species	2002	2003	2007	2009
Annual Forb	2FORB	0	2	0	0
	COMAC	0	2	0	0
	ERAM2	0	0	2	0
Perennial Forb	APCA	0	0	4	0
	ASTER	0	0	0	0
	GLLE3	2	7	1	4
	STEPH	0	0	0	0
Perennial Graminoid	DISP	114	102	85	99
	JUBA	56	55	57	65
	LECI4	0	0	4	0
	LETR5	5	5	7	10
	SPAI	87	66	80	68
Shrubs	ATTO	34	46	16	24
	ERNA10	26	36	39	44
	MACA17	0	0	4	1
	PSAR4	0	3	0	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 66. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_09

Life Forms	Species	2002	2003	2007	2009
Annual Forb	2FORB	0	0	0	0
	COMAC	0	1	0	0
	ERAM2	0	0	0	0
Perennial Forb	APCA	0	0	T	0
	ASTER	0	T	0	0
	GLLE3	T	0	T	T
	STEPH	0	T	0	0
Perennial Graminoid	DISP	11	10	11	18
	JUBA	1	2	2	4
	LECI4	0	0	T	0
	LETR5	1	1	T	1
	SPAI	16	15	18	19

Table 67. Cover (m) Shrubs BLKROC_09

Species	2003	2007	2009
ATTO	25.2	9.1	8.9
ERNA10	10.1	9.5	10.3
Total	35.3	18.7	19.2

Table 68. Ground Cover (%) BLKROC_09

Substrate	2002	2003	2007	2009
Bare Soil	8	4	5	2
Dung	2	1	2	1
Litter	83	83	93	97
Rock	0	0	0	0
Standing Dead	0	0	17	18

Table 69. Shrub Densities and Age Classes BLKROC_09

	ATTO				ERNA10			
Age Class	**2002**	**2003**	**2007**	**2009**	**2002**	**2003**	**2007**	**2009**
Seedling	0	311	21	1	6	13	4	4
Juvenile	2	22	16	2	16	65	54	37
Mature	12	43	42	25	8	27	42	26
Decadent	4	4	8	17	8	5	23	12
Total	18	380	87	45	38	110	123	79

BLKROC_10

BLKROC_10 is located in a riparian management area the White Meadow Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. The transect is located within the historical dry reach of the river. The similarity index has ranged between 6-25% during baseline period. Utilization estimates have not been conducted during the past three years because of the dense stands of fivehorn smotherweed preventing access by livestock. An increase in Nevada saltbush and fivehorn smotherweed frequency outside baseline parameters were detected during the monitoring year 2009. Nevada saltbush canopy cover and density have also showed increased values in 2007 and 2009. The site has not begun to show improvement from the return of flows since December 2006. Fire would not help to improve the site, because of the small perennial grass component in the area.

Table 70. Blackrock_10 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		% Composition by Weight				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%		23% (2)	2%	0%
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%				
	HECU3	0-2%				
Other Perennial Forbs		0-2%		2%		4% (2)
Perennial Graminoids	DISP	40-60%				
	SPAI	10-20%		12%	6%	6%
	LETR5	5-15%				
	JUBA	5-10%				
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	97% (3)	32% (3)	48% (3)	85% (3)
	ERNA10	0-3%		8% (3)	5% (3)	
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%				
Other Shrubs		0-3%	3%	7% (3)	6% (3)	5% (3)
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species		0%		15%	32%	
Total Forbs		5-10%	0%	26%	2%	4%
Total Perennial Graminoids		80%	0%	12%	6%	6%
Total Shrubs		5-15%	100%	47%	59%	90%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	15%	32%	0%
Similarity Index			6%	25%	17%	14%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

The utilization's weighted average on BLKROC_10 was not calculated due to scarcity of key species.

Table71. Frequency (%), BLKROC_10

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATTR	0	4	0	0	0
	CHBR	0	2	3	0	0
	CHIN2	0	14	28	0	0
	MENTZ	0	14	0	0	0
Perennial Forb	HECU3	0	0	0	0	0
	MALE3	0	3	7	11	21*
	SUMO	0	0	0	0	10
	STPI	0	0	4	0	0
Perennial Graminoid	DISP	0	3	0	0	0
	SPAI	0	12	18	18	21
Shrubs	ARTRW8	0	0	0	0	0
	ATTO	2	6	14	25	92**
	ARTR2	0	2	0	2	2
Nonnative	AMARA	0	6	0	0	3
	BAHY	0	3	64	0	47**
	DESO2	0	0	1	0	4
	SATR12	0	0	48	0	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 72. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_10

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATTR	0	T	0	0	0
	CHBR	0	T	T	0	0
	CHIN2	0	2	T	0	0
	MENTZ	0	1	0	0	0
Perennial Forb	HECU3	0	0	0	T	T
	MALE3	0	T	T	1	4
	SUMO	0	0	0	0	0
	STPI	0	0	T	0	0
Perennial Graminoid	DISP	0	T	0	0	0
	SPAI	0	2	1	2	3
Nonnative	AMARA	0	T	0	0	T
	BAHY	0	1	1	0	2
	DESO2	0	0	T	0	T
	SATR12	0	1	2	0	0

Table 73. Cover (m) Shrubs BLKROC_10

Species	2003	2004	2007	2009
ATTO	2.8	5.2	16.4	52.9
ERNA10	1.0	0.8	0.0	0.0
ARTR2	1.2	1.3	2.0	2.5
Total	4.9	7.3	18.3	55.4

Table 74. Ground Cover (%) BLKROC_10

Substrate	2002	2003	2004	2007	2009
Bare Soil	36	32	44	39	25
Dung	2	1	1	2	1
Litter	63	63	51	60	75
Rock	0	0	0	0	0
Standing Dead	0	0	11	3	2

Table 75. Shrub Densities and Age Classes BLKROC_10

	ATTO					ERNA10		SUMO	ARTR2
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2003**	**2004**	**2009**	**2004**
Juvenile	0	3	10	12	114	0	0	0	0
Mature	3	4	5	56	129	1	1	2	1
Decadent	1	3	0	6	1	0	0	0	0
Total	4	10	15	74	244	1	1	2	1

BLKROC_11

BLKROC_11 is located in a riparian management area in the White Meadow Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. The transect is located within the historical dry reach of the river. An adjacent grazing exclosure was constructed to the east of the transect in February 2009. A range trend transect will be placed inside the exclosure and read during subsequent monitoring periods. The similarity index has ranged between 36-64% during the baseline period. Utilization in 2009 was 64%. Inkweed, Nevada saltbush, and fivehorn smotherweed frequency increased in 2009. Perennial grass frequency did not change in 2009. Inkweed density increased during the 2009 and 2007 sampling period.

Table 76. Blackrock_11 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%		3% (2)		
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%	10% (2)	25% (2)	11% (2)	20% (2)
	HECU3	0-2%				
Other Perennial Forbs		0-2%		T		
Perennial Graminoids	DISP	40-60%	48%	28%	22%	23%
	SPAI	10-20%	11%	8%	6%	9%
	LETR5	5-15%				
	JUBA	5-10%				
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	32% (3)	24% (3)	48% (3)	36% (3)
	ERNA10	0-3%		4% (3)	11% (3)	12% (3)
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%				
Other shrubs		0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species		0%		8%	3%	
Total Forbs		5-10%	9%	28%	11%	20%
Total Perennial Graminoids		80%	59%	36%	28%	32%
Total Shrubs		5-15%	32%	29%	58%	48%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	8%	3%	0%
Similarity Index			64%	46%	36%	40%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 77. Utilization, Weighted Average, BLKROC_11

2009
64%

Table 78. Utilization by Species, BLKROC_11

	DISP	SPAI
2009	64%	65%

Table 79. Frequency (%), BLKROC_11

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATPH	0	0	2	0	0
	ATSES	0	5	0	0	0
	ATTR	0	19	7	0	2
	CHENO	0	1	0	0	0
	CHIN2	0	0	3	0	0
	GILIA	0	9	0	0	0
	MENTZ	0	2	0	0	0
Perennial Forb	MALE3	0	3	4	4	0
	SUMO	32	28	42	49	76**
Perennial Graminoid	DISP	114	107	112	103	110
	SPAI	22	39	41	36	42
Shrubs	ATTO	37	95	101	53	70*
	ERNA10	3	10	16	8	5
	SUMO	0	0	0	0	0
Nonnative	BAHY	0	42	38	0	59*

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 80. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_11

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATPH	0	0	T	0	0
	ATSES	0	T	0	0	0
	ATTR	0	1	T	0	T
	CHENO	0	T	T	0	0
	CHIN2	0	0	T	0	0
	GILIA	0	T	0	0	0
	MENTZ	0	T	0	0	0
Perennial Forb	MALE3	0	T	T	T	0
	SUMO	5	7	0	0	0
Perennial Graminoid	DISP	19	16	8	12	6
	SPAI	6	7	3	7	5
Nonnative	BAHY	0	3	1	0	1

Table 81. Cover (m) Shrubs BLKROC_11

Species	2003	2004	2007	2009
ATTO	13.6	16.5	18.3	18.9
ERNA10	3.2	5.0	8.1	3.1
SUMO	10.5	4.9	13.4	16.2
Total	27.3	26.4	39.7	38.2

Table 82. Ground Cover (%) BLKROC_11

Substrate	2002	2003	2004	2007	2009
Bare Soil	29	35	37	34	22
Dung	4	7	4	3	2
Litter	62	49	57	63	76
Rock	0	1	0	0	0
Standing Dead	0	0	0	9	3

Table 83. Shrub Densities and Age Classes BLKROC_11

	ATTO					ERNA10				SUMO			
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2002**	**2003**	**2004**	**2007**	**2002**	**2003**	**2004**	**2007**
Seedling	11	663	26	0	0	0	2	0	0	2	36	21	0
Juvenile	11	79	422	35	0	0	0	14	6	4	39	97	99
Mature	12	29	60	52	47	3	2	3	2	12	24	14	67
Decadent	1	0	5	9	0	0	0	0	3	0	0	6	8
Total	35	771	513	96	47	3	4	17	11	18	99	138	174

BLKROC_12

BLKROC_12 is located in a riparian management area in the North Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. With the exception of a decrease in Nevada saltbush frequency, values did not change when compared to the prior sampling period in 2007. Total Nevada saltbush cover did not increase in 2009, however seedling densities did increase in 2009. This pattern is not unusual because the cover of seedlings does not add significantly to line intercept cover and does not account for increases in cover of the same species at multiple layers beneath the dominant canopy. An additional ground cover class, ponded water, was observed in 2009, evidence that the water table is rising which should contribute to future decreases in Nevada saltbush. Utilization on the site met riparian pasture standards in 2009.

Table 84. Blackrock_12 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%		2%		
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%				
	HECU3	0-2%				
Other Perennial Forbs		0-2%				
Perennial Graminoids	DISP	40-60%	94% (60)	83% (60)	90% (60)	83% (60)
	SPAI	10-20%				
	LETR5	5-15%				
	JUBA	5-10%				
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				2%
Shrubs	ATTO	0-3%	6% (3)	7% (3)	10% (3)	13% (3)
	ERNA10	0-3%				
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%				
Other Shrubs		0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species		0%				
Total Forbs		5-10%	0%	2%	0%	0%
Total Perennial Graminoids		80%	94%	83%	90%	85%
Total Shrubs		5-15%	6%	7%	10%	13%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	8%	0%	2%
Similarity Index			63%	63%	63%	65%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 85. Utilization, Weighted Average, BLKROC_12

2008	2009
54%	7%

Table 86. Utilization by Species, BLKROC_12

	DISP
2008	54%
2009	7%

Table 87. Frequency (%), BLKROC_12

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATTR	0	2	0	0	0
	CHHI	0	8	0	0	0
Perennial Graminoid	DISP	141	153	153	144	142
	TYLA	0	0	0	6	0
Shrubs	ATTO	5	8	9	14	5*
	ERNA10	0	0	2	3	0
Nonnative	BAHY	0	15	6	3	7
	POMO5	0	0	0	2	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 88. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_12

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATTR	0	T	0	0	0
	CHHI	0	1	0	0	0
Perennial Graminoid	DISP	53	58	43	70	58
	TYLA	0	0	0	1	0
Nonnative	BAHY	0	3	T	1	T
	POMO5	0	0	0	T	0

Table 89. Cover (m) Shrubs BLKROC_12

Species	2003	2004	2007	2009
ATTO	4.9	4.7	10.6	4.5
SUMO	0.0	0.0	0.0	0.3
Total	4.9	4.7	10.6	4.7

Table 90. Ground Cover (%) BLKROC_12

Substrate	2002	2003	2004	2007	2009
Bare Soil	7	4	12	27	1
Dung	7	9	8	10	0
Litter	85	73	72	62	81
Rock	0	0	0	0	0
Standing Dead	0	0	8	3	4
Water	0	0	0	0	18

Table 91. Shrub Densities and Age Classes BLKROC_12

	ATTO					ERNA10		SUMO
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2007**	**2009**	**2009**
Seedling	0	22	4	0	42	0	0	0
Juvenile	1	8	42	11	65	3	2	0
Mature	2	7	25	73	33	0	1	3
Decadent	2	3	2	7	23	0	0	0
Total	5	40	73	91	163	3	3	3

BLKROC_13

BLKROC_13 is in a riparian management area located in the South Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. The similarity of the site to potential is high, ranging from 76-83%. Plant frequency in 2009 did not differ from 2007. Creeping wildrye has increased since 2004 which may be a result from increased flows but this would not explain its presence in 2004. The relative abundance creeping wildrye when compared to the total plant community is still minor with cover for the grass ranging from trace to 4%. Utilization on the transect has been at or below riparian utilization standards since implementation in 2007. This site is stable and in excellent condition.

Table 92. Blackrock_13 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%				
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%				
	HECU3	0-2%				
Other Perennial Forbs		0-2%	11% (2)	5% (2)	14% (2)	9% (2)
Perennial Graminoids	DISP	40-60%	56%	73% (60)	60%	57%
	SPAI	10-20%	21% (20)	14%	16%	12%
	LETR5	5-15%	T			1%
	JUBA	5-10%	2%	T	1%	T
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	9% (3)	8% (3)	9% (3)	16% (3)
	ERNA10	0-3%		0%	1%	3%
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%				
Other Shrubs		0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species		0%				
Total Forbs		5-10%	11%	5%	14%	9%
Total Perennial Graminoids		80%	80%	88%	76%	71%
Total Shrubs		5-15%	9%	8%	10%	20%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	0%	0%
Similarity Index			83%	79%	83%	76%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 93. Utilization, Weighted Average, BLKROC_13

2007	2008	2009
41%	27%	26%

Table 94. Utilization by Species, BLKROC_13

	DISP	LETR5	SPAI
2007	34%	45%	52%
2008	20%		34%
2009	33%	62%	12%

Table 95. Frequency (%), BLKROC_13

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	HEAN3	0	0	0	1	2
Perennial Forb	ANCA10	7	5	11	13	13
	GLLE3	0	0	0	0	0
Perennial Graminoid	DISP	129	139	128	128	121
	JUBA	22	6	13	22	19
	LETR5	7	0	0	14	20
	SPAI	34	40	36	37	34
Shrubs	ATTO	0	12	5	8	1
	ERNA10	0	0	4	3	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 96. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_13

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	HEAN3	0	0	0	T	1
Perennial Forb	ANCA10	4	2	4	4	5
	GLLE3	T	0	0	0	0
Perennial Graminoid	DISP	29	42	22	32	23
	JUBA	1	T	T	T	T
	LETR5	T	0	0	1	4
	SPAI	16	12	9	10	8

Table 97. Cover (m) Shrubs BLKROC_13

	2003	2004	2007	2009
ATTO	4.0	3.1	8.7	7.6
ERNA10	0.0	0.4	2.4	2.5
Total	4.0	3.5	11.1	10.1

Table 98. Ground Cover (%) BLKROC_13

Substrate	2002	2003	2004	2007	2009
Bare Soil	16	17	38	34	21
Dung	2	6	4	7	1
Litter	77	57	47	59	79
Rock	0	0	0	0	0
Standing Dead	0	0	0	0	1

Table 99. Shrub Densities and Age Classes BLKROC_13

	ATTO					ERNA10				
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2002**	**2003**	**2004**	**2007**	**2009**
Juvenile	1	9	12	5	6	0	0	1	1	0
Mature	8	9	7	32	41	1	1	1	1	5
Decadent	0	0	0	2	2	0	0	0	0	0
Total	9	18	19	39	49	1	1	2	2	5

BLKROC_14

BLKROC_14 is located in a riparian management area in the White Meadow Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. The similarity index for this site ranged between 9 and 60% during the baseline period. Similar to BLKROC_11, the site is located on the historical 'dry reach' of the Owens River. The site is in poor condition, and has shown no improvement since the return of flows in December 2006. Nevada saltbush significantly increased in 2009 and saltgrass significantly decreased to 0 in 2009. Utilization in 2008 was nominal. Because of the nearly impenetrable fivehorn smotherweed infestations following the burns in 2008, utilization was not estimated in 2009. Nevada saltbush is increasing on the site.

Table 100. Blackrock_14 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**			
Functional Group	**Species**	**Site Potential**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%	T		
Perennial Forbs	PYRA	0-2%			
	NIOC2	0-2%			
	SUMO	0-2%			
	HECU3	0-2%			
Other Perennial Forbs		0-2%	1%	2%	5%
Perennial Graminoids	DISP	40-60%	5%	3%	17%
	SPAI	10-20%			
	LETR5	5-15%			
	JUBA	5-10%			
	CAREX	0-5%			
	POSE	0-5%			
	LECI	0-5%			
Other Perennial Graminoids		0-5%			
Shrubs	ATTO	0-3%	44% (3)	5% (3)	78% (3)
	ERNA10	0-3%			
	ROWO	0-3%			
	SAEX	0-3%			
	SAVE4	0-3%			
Other Shrubs		0-3%			
Trees	POFR2	2-5%			
	SALA3	2-5%			
Nonnative Species		0%	50%	90%	
Total Forbs		5-10%	1%	2%	5%
Total Perennial Graminoids		80%	5%	3%	17%
Total Shrubs		5-15%	44%	5%	78%
Total Trees		4-10%	0%	0%	0%
Total Nonnative Species		0%	50%	90%	0%
Similarity Index			9%	8%	25%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.					

Table 101. Utilization, Weighted Average, BLKROC_14

2007	2008
87%	9%

Table 102. Utilization by Species, BLKROC_14

	DISP
2007	87%
2008	9%

Table 103. Frequency (%), BLKROC_14

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATTR	0	0	5	0	0
	CHENO	0	0	0	0	0
	CHIN2	0	3	3	0	0
Perennial Forb	HECU3	0	5	0	0	0
	MALE3	0	4	4	6	7
	SUMO	0	0	0	0	4
Perennial Graminoid	DISP	14	21	14	10	0**
Shrubs	ATTO	0	4	8	11	24**
Nonnative	BAHY	0	14	67	0	2
	DESO2	0	0	2	0	0
	SATR12	0	20	90	0	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 104. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_14

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATTR	0	0	T	0	0
	CHENO	0	T	0	0	0
	CHIN2	0	T	T	0	0
Perennial Forb	HECU3	0	T	0	0	0
	MALE3	0	T	T	1	1
	SUMO	0	0	0	0	0
Perennial Graminoid	DISP	T	1	T	2	0
Nonnative	BAHY	0	5	2	0	1
	DESO2	0	0	T	0	0
	SATR12	0	2	4	0	0

Table 105. Cover (m) Shrubs BLKROC_14

Species	2003	2004	2007	2009
ATTO	8.8	0.4	10.1	27.3
Total	8.8	0.4	10.1	27.3

Table 106. Ground Cover (%) BLKROC_14

Substrate	2002	2003	2004	2007	2009
Bare Soil	84	75	92	84	6
Dung	2	1	1	1	0
Litter	15	23	7	12	94
Rock	0	0	0	0	0
Standing Dead	0	0	0	3	2
TARA Slash	0	0	1	2	0

Table 107. Shrub Densities and Age Classes BLKROC_14

	ATTO			ERNA10	SUMO
Age Class	**2004**	**2007**	**2009**	**2009**	**2009**
Juvenile	8	2	207	6	178
Mature	0	17	224	4	83
Decadent	0	0	3	2	3
Total	8	19	434	12	264

BLKROC_15

BLKROC_15 is in a riparian management area, located in the Reservation Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. The site is located on the historical 'dry reach' of the Owens and has not begun to show signs of recovery since the return of flows in December 2006. The similarity index is poor for the site ranging between 8-11%. Tamarisk slash was burned at the site in the winter months of 2008 and subsequently invaded by fivehorn smotherweed. Frequency for fivehorn smotherweed and Nevada saltbush increased in 2009 while frequency for saltgrass has steadily declined since monitoring has begun on the site. Since 2008, due to lack of key forage species and density of fivehorn smotherweed, utilization has not been estimated for the site.

Table 108. Blackrock_15 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2003**	**2004**	**2005**	**2007**
Annual Forbs	AAFF	Trace to 2%	1%		8% (2)	
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%	4% (2)	4% (2)	3% (2)	29% (2)
	HECU3	0-2%				
Other Perennial Forbs		0-2%				
Perennial Graminoids	DISP	40-60%	2%	1%	1%	T
	SPAI	10-20%				
	LETR5	5-15%				
	JUBA	5-10%				
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	74% (3)	72% (3)	70% (3)	62% (3)
	ERNA10	0-3%				
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%	17% (3)	23% (3)	14% (3)	8% (3)
Other Shrubs		0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species		0%				
Total Forbs		5-10%	5%	4%	10%	29%
Total Perennial Graminoids		80%	2%	1%	1%	0%
Total Shrubs		5-15%	91%	95%	84%	70%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	1%	0%	4%	0%
Similarity Index			11%	9%	11%	8%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 109. Frequency (%), BLKROC_15

Life Forms	Species	2003	2004	2005	2007	2009
Annual Forb	ATTR	0	0	16	0	0
	CHIN2	14	4	29	0	0
	ERAM2	0	0	5	0	0
	GITR	0	0	4	0	0
	LEFL2	0	0	3	0	0
	MEAL6	0	0	21	0	0
	NADE	0	0	1	0	0
Perennial Forb	SUMO	15	18	39	31	32
Perennial Graminoid	DISP	25	21	19	14	3**
Shrubs	ATTO	48	35	80	29	47**
	SAVE4	2	9	2	6	5
Nonnative	BAHY	6	2	17	0	23**
	DESO2	0	3	10	0	0
	SATR12	0	1	2	0	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 110. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_15

Life Forms	Species	2003	2004	2005	2007	2009
Annual Forb	ATTR	0	0	1	0	0
	CHIN2	1	T	1	0	0
	ERAM2	0	0	T	0	0
	GITR	0	0	T	0	0
	LEFL2	0	0	T	0	0
	MEAL6	0	0	1	0	0
	NADE	0	0	T	0	0
Perennial Forb	SUMO	0	0	0	0	0
Perennial Graminoid	DISP	1	T	T	T	T
Nonnative	BAHY	T	T	T	0	3
	DESO2	0	T	1	0	0
	SATR12	0	T	T	0	0

Table 111. Cover (m) Shrubs BLKROC_15

Species	2003	2004	2005	2007	2009
ATTO	25.4	15.1	19.3	32.9	34.8
SAVE4	10.1	8.0	6.6	7.6	9.1
SUMO	1.8	1.2	0.9	20.3	23.7
Total	37.3	24.3	26.8	60.8	67.6

Table 112. Ground Cover (%) BLKROC_15

Substrate	2003	2004	2005	2007	2009
Bare Soil	22	32	36	30	9
Dung	2	1	1	1	0
Litter	75	67	61	69	91
Rock	0	0	0	0	0
Standing Dead	0	20	27	19	5

Table 113. Shrub Densities and Age Classes BLKROC_15

	ATTO					SAVE4					SUMO				
Age Class	2003	2004	2005	2007	2009	2003	2004	2005	2007	2009	2003	2004	2005	2007	2009
Seedling	54	1	317	0	0	0	0	0	0	0	8	0	278	0	0
Juvenile	57	21	49	12	21	0	2	2	1	2	19	20	55	19	4
Mature	18	10	22	42	48	6	2	8	6	9	19	7	12	32	37
Decadent	7	39	3	3	5	2	1	1	3	0	0	8	0	2	1
Total	136	71	391	57	74	8	5	11	10	11	46	35	345	53	42

BLKROC_16

BLKROC_16 is located in a riparian management area on the Reservation Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. Similar to BLKROC_17, BLKROC_15, BLKROC_14, and BLKROC_11 the site is on the historical 'dry reach' of the Owens River and has not begun to show signs of recovery. The site is shrub dominated with no perennial grass component. Frequency in 2009 did not differ from the previous sampling period in 2007. Nevada saltbush canopy cover has steadily increased in 2007 and 2009. Utilization has not been estimated on the site because of the absence of key forage species.

Table 114. Blackrock_16 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2003**	**2004**	**2005**	**2007**
Annual Forbs	AAFF	Trace to 2%	8% (2)	1%	17% (2)	
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%				
	HECU3	0-2%				
Other Perennial Forbs		0-2%			6% (2)	
Perennial Graminoids	DISP	40-60%				
	SPAI	10-20%				
	LETR5	5-15%				
	JUBA	5-10%				
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	38% (3)	28% (3)	32% (3)	68% (3)
	ERNA10	0-3%				
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%	39% (3)	58% (3)	36% (3)	32% (3)
Other Shrubs		0-3%	2%	4% (3)		
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species		0%	13%	8%	9%	
Total Forbs		5-10%	8%	1%	23%	0%
Total Perennial Graminoids		80%	0%	0%	0%	0%
Total Shrubs		5-15%	79%	90%	68%	100%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	13%	8%	9%	0%
Similarity Index			10%	10%	10%	6%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 115. Frequency (%), BLKROC_16

Life Forms	Species	2003	2004	2005	2007	2009
Annual Forb	ATSES	4	0	0	0	0
	ATTR	0	0	18	0	0
	CHIN2	13	16	37	0	0
	CRYPT	0	0	3	0	0
	ERAM2	0	0	0	0	0
	ERIOG	10	0	0	0	0
	ERMA2	0	11	23	0	0
	GITR	0	0	20	0	0
Perennial Forb	MACA2	0	0	59	0	0
	SUMO	0	0	7	0	0
Shrubs	ATCO	7	0	3	4	9
	ATTO	19	23	33	31	39
	SAVE4	5	12	6	8	11
Nonnative	BAHY	3	7	4	0	17*
	SATR12	11	41	44	0	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 116. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_16

Life Forms	Species	2003	2004	2005	2007	2009
Annual Forb	ATSES	T	0	0	0	0
	ATTR	0	0	T	0	0
	CHIN2	2	T	3	0	0
	CRYPT	0	0	T	0	0
	ERAM2	T	0	0	0	0
	ERIOG	0	0	0	0	0
	ERMA2	0	T	T	0	0
	GITR	0	0	T	0	0
Perennial Forb	MACA2	0	0	2	0	0
	SUMO	0	0	0	0	0
Nonnative	BAHY	T	T	T	0	3
	SATR12	2	1	1	0	0

Table 117. Cover (m) Shrubs BLKROC_16

Species	2003	2004	2005	2007	2009
ATCO	0.4	0.5	0.0	0.0	0.4
ATTO	6.5	2.9	5.2	16.8	44.2
SAVE4	11.0	10.4	9.8	13.3	12.4
SUMO	0.0	0.0	0.0	0.0	0.0
Total	17.9	13.8	15.0	30.1	56.9

Table 118. Ground Cover (%) BLKROC_16

Substrate	2003	2004	2005	2007	2009
Bare soil	38	47	51	44	33
Dung	1	1	1	1	1
Litter	59	50	48	55	66
Rock	0	0	0	0	0
Standing Dead	0	21	19	2	4

Table 119. Shrub Densities and Age Classes BLKROC_16

	ATCO				ATTO					SAVE4				
Age Class	**2003**	**2005**	**2007**	**2009**	**2003**	**2004**	**2005**	**2007**	**2009**	**2003**	**2004**	**2005**	**2007**	**2009**
Seedling	3	0	0	0	17	0	41	0	0	0	0	2	0	0
Juvenile	1	3	7	6	80	33	6	14	7	1	0	0	4	5
Mature	2	2	1	7	9	10	10	56	66	4	5	8	7	9
Decadent	2	0	0	0	2	12	0	3	4	2	0	0	0	0
Total	8	5	8	13	108	55	57	73	77	7	5	10	11	14

BLKROC_17

BLKROC_17 is located in a riparian management area on the Reservation Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. The similarity index has ranged between 3-5% for the site. Similar to other sites on the historical 'dry reach' of the Owens River, BLKROC_17 has not begun to respond from returned river flows. The site is shrub dominated (Nevada saltbush) with little to no perennial grass component. Frequency did not differ between 2009 and 2007 with the exception of the appearance of tumbleweed (*Salsola traga* [SATR]) in 2009 on the transect. Tumbleweed has been observed in the area previously, its appearance is new to the transect but not the area. No utilization estimates for the transect have been made because the site lacks key forage species.

Table 120. Blackrock_17 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2003**	**2004**	**2005**	**2007**
Annual Forbs	AAFF	Trace to 2%	5% (2)	1%	61% (2)	
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%				
	HECU3	0-2%				
Other perennial Forbs		0-2%				
Perennial Graminoids	DISP	40-60%				
	SPAI	10-20%				
	LETR5	5-15%				
	JUBA	5-10%				
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	94% (3)	99% (3)	38% (3)	100% (3)
	ERNA10	0-3%				
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%				
Other Shrubs		0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species		0%	1%		1%	
Total Forbs		5-10%	5%	1%	61%	0%
Total Perennial Graminoids		80%	0%	0%	0%	0%
Total Shrubs		5-15%	94%	99%	38%	100%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	1%	0%	1%	0%
Similarity Index			5%	4%	5%	3%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Utilization at BLKROC_17 was not addressed due to scarcity of key species

Table 121. Frequency (%), BLKROC_17

Life Forms	Species	2003	2004	2005	2007	2009
Annual Forb	ATSES	12	0	8	0	0
	ATTR	3	0	31	0	0
	CHIN2	13	10	40	0	0
	CHLE4	0	0	1	0	0
	CRCI2	0	0	4	0	0
	ERWI	0	0	7	0	0
	GITR	0	0	32	0	0
	LEFL2	0	0	54	0	0
	MEAL6	0	0	29	0	0
Perennial Forb	HECU3	0	0	0	0	0
Perennial Graminoid	HOJU	0	0	2	0	0
Shrubs	ATTO	70	34	74	45	49
Nonnative	DESO2	0	0	6	0	0
	SATR12	9	10	6	0	3

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 122. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_17

Life Forms	Species	2003	2004	2005	2007	2009
Annual Forb	ATSES	T	0	T	0	0
	ATTR	1	0	3	0	0
	CHIN2	T	T	1	0	0
	CHLE4	0	0	T	0	0
	CRCI2	0	0	T	0	0
	ERWI	0	0	T	0	0
	GITR	0	0	T	0	0
	LEFL2	0	0	4	0	0
	MEAL6	0	0	1	0	0
Perennial Forb	HECU3	0	0	0	0	T
Perennial Graminoid	HOJU	0	0	T	0	0
Nonnative	DESO2	0	0	T	0	0
	SATR12	0.5	T	T	0.0	T

Table 123. Cover (m) Shrubs BLKROC_17

Species	2003	2004	2005	2007	2009
ATTO	37.5	5.7	5.6	28.0	37.7
Total	37.5	5.7	5.6	28.0	37.7

Table 124. Ground Cover (%) BLKROC_17

Substrate	2003	2004	2005	2007	2009
Bare Soil	39	47	50	38	41
Dung	1	0	1	1	0
Litter	59	53	50	56	59
Rock	0	0	0	0	0
Standing Dead	0	34	29	16	11

Table 125. Shrub Densities and Age Classes BLKROC_17

	ATTO				
Age Class	**2003**	**2004**	**2005**	**2007**	**2009**
Seedling	723	0	201	0	0
Juvenile	497	5	18	34	18
Mature	14	4	14	76	87
Decadent	7	22	3	15	3
Total	1241	31	236	125	108

BLKROC_18

BLKROC_18 is a riparian management area located in the Wrinkle Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. The similarity index has ranged between 53-75%. Saltgrass frequency decreased significantly between 2007 and 2009; however, this change in 2009 did not range beyond the entire baseline dataset. There were no changes for all other species. In general shrub cover exceeds what is expected for the site at its potential. This area would benefit from a maintenance burn. Utilization has consistently remained below the 40% riparian standard.

Table 126. BLKROC_18 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2003**	**2004**	**2005**	**2007**
Annual Forbs	AAFF	Trace to 2%	T		2%	
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%				
	HECU3	0-2%				
Other Perennial Forbs		0-2%	T	6% (2)	2%	T
Perennial Graminoids	DISP	40-60%	57%	47%	35%	38%
	SPAI	10-20%	3%	22% (20)	20%	9%
	LETR5	5-15%				
	JUBA	5-10%				
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	31% (3)	16% (3)	17% (3)	46% (3)
	ERNA10	0-3%	6% (3)	9% (3)	8% (3)	7% (3)
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%				
Other Shrubs		0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species		0%	2%		17%	
Total Forbs		5-10%	1%	6%	4%	0%
Total Perennial Graminoids		80%	60%	68%	55%	47%
Total Shrubs		5-15%	37%	25%	24%	53%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	2%	0%	17%	0%
Similarity Index			66%	75%	65%	53%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 127. Utilization, Weighted Average, BLKROC_18

2007	2008	2009
29%	21%	39%

Table 128. Utilization by Species, BLKROC_18

	DISP	SPAI
2007	28%	30%
2008	18%	25%
2009	40%	37%

Table 129. Frequency (%), BLKROC_18

Life Forms	Species	2003	2004	2005	2007	2009
Annual Forb	ATSES	3	0	0	0	0
	ATTR	0	0	0	0	0
	CHLE4	0	0	5	0	0
	GITR	0	0	4	0	0
Perennial Forb	GLLE3	3	6	9	4	1
Perennial Graminoid	DISP	119	104	114	118	102*
	SPAI	4	16	20	12	21
	TYLA	0	0	0	0	3
Shrubs	ATTO	33	12	24	19	20
	ERNA10	1	2	10	1	0
Nonnative	BAHY	14	10	45	0	0
	SATR12	0	0	3	0	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 130. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_18

Life Forms	Species	2003	2004	2005	2007	2009
Annual Forb	ATSES	T	0	0	0	0
	ATTR	0	0	T	0	0
	CHLE4	0	0	T	0	0
	GITR	0	0	T	0	0
Perennial Forb	GLLE3	T	2	1	T	1
Perennial Graminoid	DISP	33	11	12	25	18
	SPAI	3	8	10	9	12
	TYLA	0	0	0	0	T
Nonnative	BAHY	1	T	4	0	0
	SATR12	0	0	T	0	0

Table 131. Cover (m) Shrubs BLKROC_18

Species	2003	2004	2005	2007	2009
ATTO	17.0	3.5	5.5	29.1	15.2
ERNA10	4.9	2.8	3.5	5.7	4.0
Total	21.9	6.3	9.0	34.8	19.2

Table 132. Ground Cover (%) BLKROC_18

Substrate	2003	2004	2005	2007	2009
Bare soil	17	42	39	36	19
Dung	3	4	4	2	2
Litter	76	47	51	61	76
Rock	0	0	0	0	0
Standing dead	0	2	2	3	5
Water	0	0	0	0	3

Table 133. Shrub Densities and Age Classes BLKROC_18

	ATTO					ERNA10					SUMO	
Age Class	**2003**	**2004**	**2005**	**2007**	**2009**	**2003**	**2004**	**2005**	**2007**	**2009**	**2004**	**2009**
Seedling	582	0	487	0	13	1	0	10	0	0	0	0
Juvenile	415	110	85	77	299	0	2	3	3	9	1	0
Mature	38	37	22	87	84	13	8	8	9	9	0	1
Decadent	0	30	1	6	8	2	0	0	3	3	0	0
Total	1035	177	595	170	404	16	10	21	15	21	1	1

BLKROC_19

BLKROC_19 is located in a riparian management area in the Wrinkle Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. The similarity index on the site has ranged between 71-79%. Saltgrass frequency increased significantly in 2009 when compared to 2007 but remained within observed ranges during the baseline sampling period. All other plant frequencies were static compared to 2007. Shrub cover has increased over time at the site. Utilization has been minimal for all years.

Table 134. Blackrock_19 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2003**	**2004**	**2005**	**2007**
Annual Forbs	AAFF	Trace to 2%				
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%				
	HECU3	0-2%				
Other Perennial Forbs		0-2%				
Perennial Graminoids	DISP	40-60%	81% (60)	88% (60)	79% (60)	69% (60)
	SPAI	10-20%	5%	5%	8%	10%
	LETR5	5-15%				
	JUBA	5-10%	2%	T	7%	T
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	7% (3)	3%	5% (3)	19% (3)
	ERNA10	0-3%	3%	3%	1%	3%
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%				
Other Shrubs		0-3%	2%			
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species		0%				
Total Forbs		5-10%	0%	0%	0%	0%
Total Perennial Graminoids		80%	88%	94%	93%	78%
Total Shrubs		5-15%	12%	6%	7%	22%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	0%	0%
Similarity Index			75%	71%	79%	76%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 135. Utilization, weighted average, BLKROC_19

2007	2008	2009
6%	12%	14%

Table 136. Utilization by Species, BLKROC_19

	DISP	SPAI
2007	9%	
2008	14%	8%
2009	16%	7%

Table 137. Frequency (%), BLKROC_19

Life Forms	Species	2003	2004	2005	2007	2009
Annual forb	ATSES	4	0	0	0	0
	ATTR	0	0	2	0	0
	CHLE4	0	0	6	0	0
	GITR	0	0	5	0	0
Perennial graminoid	DISP	139	147	139	127	143**
	JUBA	13	20	6	26	21
	LETR5	3	0	1	0	0
	SPAI	9	8	12	10	10
Shrubs	ATTO	0	6	31	24	18
	ERNA10	0	3	5	0	3

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 138. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_19

Life Forms	Species	2003	2004	2005	2007	2009
Annual forb	ATSES	T	0	0	0	0
	ATTR	0	0	T	0	0
	CHLE4	0	0	T	0	0
	GITR	0	0	T	0	0
Perennial graminoid	DISP	44	47	45	34	26
	JUBA	1	T	4	T	1
	LETR5	0	0	T	0	0
	SPAI	4	4	6	7	3

Table 139. Cover (m) Shrubs BLKROC_19

Species	2003	2004	2005	2007	2009
ATPO	0.7	0.0	0.0	0.0	0.0
ATTO	3.6	1.5	2.9	8.8	13.6
ERNA10	2.0	2.1	0.9	1.8	3.1
Total	6.3	3.6	3.8	10.6	16.7

Table 140. Ground Cover (%) BLKROC_19

Substrate	2003	2004	2005	2007	2009
Bare soil	12	52	45	40	17
Dung	0	1	1	0	2
Litter	81	35	45	59	78
Rock	0	0	0	0	0
Standing dead	0	3	5	4	4

Table 141. Shrub Densities and Age Classes BLKROC_19

	ATTO					ERNA10				
Age Class	**2003**	**2004**	**2005**	**2007**	**2009**	**2003**	**2004**	**2005**	**2007**	**2009**
Seedling	2	0	61	0	15	0	0	0	0	2
Juvenile	11	7	22	99	24	9	9	8	10	1
Mature	9	4	6	48	36	5	3	7	6	8
Decadent	1	2	0	2	5	6	4	2	3	5
Total	23	13	89	149	80	20	16	17	19	16

BLKROC_20

BLKROC_20 is located in the Wrinkle Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. The similarity index has ranged between 63-74% for the site. Creeping wildrye and fivehorn smotherweed frequency increased outside baseline parameters in 2009. Nevada saltbush cover and density have steadily increased since 2005, making the area a good candidate for a maintenance burn. Utilization has been nominal during all three sample years.

Table 142. Blackrock_20 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2003**	**2004**	**2005**	**2007**
Annual Forbs	AAFF	Trace to 2%			1%	
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%	T			
	HECU3	0-2%				
Other Perennial Forbs		0-2%				
Perennial Graminoids	DISP	40-60%	68% (60)	75% (60)	63% (60)	53%
	SPAI	10-20%	2%	3%	2%	1%
	LETR5	5-15%	1%	2%	6%	3%
	JUBA	5-10%				
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	17% (3)	10% (3)	22% (3)	36% (3)
	ERNA10	0-3%	12% (3)	9% (3)	6% (3)	6% (3)
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%		T		T
Other Shrubs		0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species		0%			1%	
Total Forbs		5-10%	0%	0%	1%	0%
Total Perennial Graminoids		80%	71%	80%	71%	57%
Total Shrubs		5-15%	29%	20%	27%	43%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	1%	0%
Similarity Index			69%	71%	74%	63%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 143. Utilization, Weighted Average, BLKROC_20

2007	**2008**	**2009**
3%	13%	31%

Table 144. Utilization by Species, BLKROC_20

	DISP	LETR5	SPAI
2007	9%	2%	
2008	13%		
2009	29%	42%	14%

Table 145. Frequency (%), BLKROC_20

Life Forms	Species	2003	2004	2005	2007	2009
Annual Forb	ATTR	0	0	7	0	0
Perennial Graminoid	DISP	127	147	143	126	123
	LETR5	18	29	30	31	59**
	SPAI	5	4	5	5	5
Shrubs	ATTO	6	2	27	19	18
	ERNA10	0	1	1	0	3
Nonnative	BAHY	5	0	6	0	16**

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 146. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_20

Life Forms	Species	2003	2004	2005	2007	2009
Annual Forb	ATTR	0	0	T	0	0
Perennial Graminoid	DISP	38	52	53	42	39
	LETR5	1	2	5	3	7
	SPAI	2	3	3	2	T
Nonnative	BAHY	T	0	T	0	1

Table 147. Cover (m) Shrubs BLKROC_20

Species	2003	2004	2005	2007	2009
ATTO	8.8	6.8	17.0	27.1	30.3
ERNA10	8.6	8.3	6.4	6.5	6.4
SAVE4	0.0	0.1	0.0	0.3	0.7
SUMO	0.1	0.0	0.0	0.0	0.0
Total	17.5	15.3	23.4	33.8	37.3

Table 148. Ground Cover (%) BLKROC_20

Substrate	2003	2004	2005	2007	2009
Bare Soil	0	5	4	9	0
Dung	3	2	6	7	2
Litter	89	79	76	90	98
Rock	0	0	0	0	0
Standing Dead	0	16	15	13	18

Table 149. Shrub Densities and Age Classes BLKROC_20

	ATTO					ERNA10				
Age Class	**2003**	**2004**	**2005**	**2007**	**2009**	**2003**	**2004**	**2005**	**2007**	**2009**
Seedling	3	0	135	0	70	0	0	2	0	0
Juvenile	33	24	24	157	26	0	1	3	0	0
Mature	51	19	41	52	48	7	5	12	5	5
Decadent	2	5	0	9	4	2	3	1	5	4
Total	89	48	200	218	148	9	9	18	10	9

Table 149. continued.

	SAVE4					SUMO	
Age Class	**2003**	**2004**	**2005**	**2007**	**2009**	**2004**	**2007**
Seedling	0	0	0	0	0	0	0
Juvenile	0	0	0	0	0	5	1
Mature	0	1	1	1	1	0	0
Decadent	1	0	0	0	0	0	0
Total	1	1	1	1	1	5	1

BLKROC_21

BLKROC_21 is in a riparian management area located in the Wrinkle Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. Similarity index has ranged between 58-68% during the baseline period. The site's shrub component is greater than what would be expected for a moist flood plain site at its potential. Plant frequency did not differ in 2009 from 2007. The plant frequency trend is fairly static with the exception of a period of shrub recruitment in 2005. Shrub cover has decreased for the site. Utilization has been minimal during the past three years of sampling.

Table 150. Blackrock_21 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		% Composition by Weight				
Functional Group	**Species**	**Site Potential**	**2003**	**2004**	**2005**	**2007**
Annual Forbs	AAFF	Trace to 2%				
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%	3% (2)		T	
	HECU3	0-2%				
Other Perennial Forbs		0-2%				
Perennial Graminoids	DISP	40-60%	51%	67% (60)	59%	54%
	SPAI	10-20%	T	1%	T	T
	LETR5	5-15%			T	1%
	JUBA	5-10%				
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	44% (3)	27% (3)	37% (3)	36% (3)
	ERNA10	0-3%	2%	4% (3)	3%	9% (3)
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%				
Other Shrubs		0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species		0%				
Total Forbs		5-10%	2%	0%	0%	0%
Total Perennial Graminoids		80%	51%	68%	60%	56%
Total Shrubs		5-15%	46%	32%	40%	44%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	0%	0%
Similarity Index			58%	67%	65%	61%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 151. Utilization, Weighted Average, BLKROC_21

2007	2008	2009
0%	12%	24%

Table 152. Utilization by Species, BLKROC_21

	DISP
2007	1%
2008	12%
2009	24%

Table 153. Frequency (%), BLKROC_21

Life Forms	Species	2003	2004	2005	2007	2009
Annual Forb	ATSES	3	0	0	0	0
	ATTR	0	0	2	0	0
Perennial Forb	SUMO	4	0	3	0	0
Perennial Graminoid	DISP	135	133	142	136	130
	LETR5	0	2	5	5	8
	SPAI	1	4	3	1	4
Shrubs	ATTO	23	13	42	10	10
	ERNA10	3	1	0	1	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 154. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_21

Life Forms	Species	2003	2004	2005	2007	2009
Annual Forb	ATSES	T	0	0	0	0
	ATTR	0	0	T	0	0
Perennial Forb	SUMO	0	0	0	0	0
Perennial Graminoid	DISP	37	53	50	39	26
	LETR5	0	T	T	1	2
	SPAI	T	1	1	T	1

Table 155. Cover (m) Shrubs BLKROC_21

Species	2003	2004	2005	2007	2009
ATTO	29.4	20.2	29.0	23.7	16.8
ERNA10	2.2	4.3	3.0	8.0	1.2
SUMO	2.2	0.0	0.2	0.0	0.0
Total	33.7	24.5	32.2	31.7	18.0

Table 156. Ground Cover (%) BLKROC_21

Substrate	2003	2004	2005	2007	2009
Bare Soil	0	22	13	7	10
Dung	1	2	2	0	3
Litter	93	66	75	93	87
Rock	0	0	0	0	0
Standing Dead	0	9	8	14	9

Table 157. Shrub Densities and Age Classes BLKROC_21

	ATTO					ERNA10					SAVE4	SUMO				
Age Class	**2003**	**2004**	**2005**	**2007**	**2009**	**2003**	**2004**	**2005**	**2007**	**2009**	**2009**	**2003**	**2004**	**2005**	**2007**	**2009**
Seedling	1	0	141	0	0	0	0	0	0	0	0	0	0	10	0	0
Juvenile	4	22	31	1	0	0	5	3	2	1	1	0	8	6	3	1
Mature	74	32	50	62	44	3	3	3	5	4	0	2	1	4	0	2
Decadent	10	18	2	7	8	4	0	0	1	6	0	1	0	0	0	1
Total	89	72	224	70	52	7	8	6	8	11	1	3	9	20	3	4

BLKROC_22

BLKROC_22 is located in a riparian management area in the North Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. Similarity index has been at 57% for 2006-07. Saltgrass frequency increased significantly in 2009 as compared to 2007, but remains within baseline ranges. All other frequency values remained static in 2009.

Table 158. Blackrock_22 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**		
Functional Group	**Species**	**Site Potential**	**2006**	**2007**
Annual Forbs	AAFF	Trace to 2%		
Perennial Forbs	PYRA	0-2%		
	NIOC2	0-2%		
	SUMO	0-2%	1%	1%
	HECU3	0-2%		
Other Perennial Forbs		0-2%		
Perennial Graminoids	DISP	40-60%	44%	44%
	SPAI	10-20%	3%	3%
	LETR5	5-15%		
	JUBA	5-10%		
	CAREX	0-5%		
	POSE	0-5%		
	LECI	0-5%		
Other Perennial Graminoids		0-5%		
Shrubs	ATTO	0-3%	24% (3)	26% (3)
	ERNA10	0-3%	12% (3)	18% (3)
	ROWO	0-3%		
	SAEX	0-3%		
	SAVE4	0-3%		
Other Shrubs		0-3%	4% (3)	8% (3)
Trees	POFR2	2-5%		
	SALA3	2-5%		
Nonnative Species		0%	11%	
Total Forbs		5-10%	1%	1%
Total Perennial Graminoids		80%	48%	48%
Total Shrubs		5-15%	40%	51%
Total Trees		4-10%	0%	0%
Total Nonnative Species		0%	11%	0%
Similarity Index			57%	57%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.				

Table 159. Utilization, weighted average, BLKROC_22

2007	**2008**	**2009**
72%	32%	36%

Table 160. Utilization by Species, BLKROC_22

	DISP	SPAI
2007	72%	75%
2008	31%	35%
2009	31%	61%

Table 161. Frequency (%), BLKROC_22

Life Forms	Species	2006	2007	2009
Perennial Forb	SUMO	3	6	2
Perennial Graminoid	DISP	124	111	125*
	SPAI	4	4	3
Shrubs	ALOC2	4	4	10
	ATTO	21	7	19
	ERNA10	5	4	11
Nonnative	BAHY	11	0	9

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 162. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_22

Life Forms	Species	2006	2007	2009
Perennial Forb	SUMO	0	0	0
Perennial Graminoid	DISP	23	18	17
	SPAI	3	2	3
Nonnative	BAHY	4	0	T

Table 163. Cover (m) Shrubs BLKROC_22

Species	2006	2007	2009
ALOC2	3.3	2.3	0.0
ATTO	11.4	9.9	9.6
ERNA10	8.0	9.1	6.9
SUMO	0.9	0.5	0.6
Total	23.6	21.9	17.1

Table 164. Ground Cover (%) BLKROC_22

Substrate	2006	2007	2009
Bare Soil	43	36	28
Dung	3	1	2
Litter	53	63	70
Rock	0	0	0
Standing Dead	7	4	7

Table 165. Shrub Densities and Age Classes BLKROC_22

	ATTO			ERNA10		SUMO		
Age Class	**2006**	**2007**	**2009**	**2007**	**2009**	**2006**	**2007**	**2009**
Seedling	15	0	237	0	2	11	0	2
Juvenile	72	14	18	9	4	5	5	4
Mature	19	28	27	18	14	4	2	2
Decadent	4	4	5	1	13	0	0	2
Total	110	46	287	28	33	20	7	10

BLKROC_23

BLKROC_23 is in a riparian management area located in the South Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. The similarity index ranged between 78-79%. The site is in excellent condition with a minimal shrub component. Frequency values have not varied over the three sampling periods. Shrub cover and density have also remained static over the past three sampling periods. Utilization has remained within the 40% standard for riparian pastures.

Table 166. Blackrock_23 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**		
Functional Group	**Species**	**Site Potential**	**2006**	**2007**
Annual Forbs	AAFF	Trace to 2%	T	
Perennial Forbs	PYRA	0-2%		
	NIOC2	0-2%		
	SUMO	0-2%		
	HECU3	0-2%		
Other Perennial Forbs		0-2%		
Perennial Graminoids	DISP	40-60%	81% (60)	82% (60)
	SPAI	10-20%	17%	16%
	LETR5	5-15%		
	JUBA	5-10%		
	CAREX	0-5%		
	POSE	0-5%		
	LECI	0-5%		
Other Perennial Graminoids		0-5%		
Shrubs	ATTO	0-3%	2%	2%
	ERNA10	0-3%		
	ROWO	0-3%		
	SAEX	0-3%		
	SAVE4	0-3%		
Other Shrubs		0-3%		
Trees	POFR2	2-5%		
	SALA3	2-5%		
Nonnative Species		0%		
Total Forbs		5-10%	T	0%
Total Perennial Graminoids		80%	97%	98%
Total Shrubs		5-15%	2%	2%
Total Trees		4-10%	0%	0%
Total Nonnative Species		0%	0%	0%
Similarity Index			79%	78%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.				

Table 167. Utilization, Weighted Average, BLKROC_23

2007	**2008**	**2009**
25%	10%	38%

Table 168. Utilization by Species, BLKROC_23

	DISP	SPAI
2007	22%	32%
2008	6%	15%
2009	47%	24%

Table 169. Frequency (%), BLKROC_23

Life Forms	Species	2006	2007	2009
Annual Forb	ATSES	18	0	0
Perennial Graminoid	DISP	139	133	139
	SPAI	25	28	28
Nonnative	BAHY	4	0	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 170. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_23

Life Forms	Species	2006	2007	2009
Annual Forb	ATSES	T	0	0
Perennial Graminoid	DISP	35	47	35
	SPAI	11	14	8
Nonnative	BAHY	T	0	0

Table 171. Cover (m) Shrubs BLKROC_23

Species	2006	2007	2009
ATTO	1.0	0.8	0.6
Total	1.0	0.8	0.6

Table 172. Ground Cover (%) BLKROC_23

Substrate	2006	2007	2009
Bare Soil	47	26	14
Dung	2	3	1
Litter	52	71	85
Rock	0	0	0
Standing Dead	0	0	0

Table 173. Shrub Densities and Age Classes BLKROC_23

	ATTO			ERNA10
Age Class	**2006**	**2007**	**2009**	**2009**
Juvenile	3	0	1	1
Mature	2	7	6	0
Decadent	0	0	1	0
Total	5	7	8	1

BLKROC_39

BLKROC_39 is located on an upland site in the upland White Meadow Field. The soils are Division-Numu Complex, 0 to 2% slopes, which corresponds to the Saline Bottom ecological site. The similarity index ranged between 55-64% during the baseline period. However, based on ocular estimates, production is far less than typical for a Saline Meadow site. The site was scraped during the wet winter of 1968-69. The loss of the horizon during this period has likely contributed to the poor productivity of the site. Frequency in 2009 did not differ from 2007 and has not shifted beyond baseline frequency values. Utilization has been minimal during the past three years.

Table 174. Blackrock_39 Comparison to Saline Meadow Ecological Site

Ecological Site: Saline Meadow		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%				
Perennial Forbs	ANCA10	0-2%				
	CALI4	0-2%				
	PYRA	0-2%				
Other Perennial Forbs		0-2%	5% (2)	2%	6% (2)	6% (2)
Perennial Graminoids	DISP	25-50%	45%	40%	51% (50)	48%
	SPAI	25-50%				
	JUBA	5-15%	1%			
	LETR5	5-10%				
	CAREX	0-2%				
	POSE	0-2%				
	LECI	0-2%				
Other Perennial Graminoids		0-2%				
Shrubs	ATTO	0-5%	29% (5)	43% (5)	35% (5)	34% (5)
	ERNA10	0-5%		1%		3%
	ROWO	0-5%				
	SALIX	0-5%				
	SAVE4	0-5%	12% (5)	11% (5)		1%
Other Shrubs		0-5%	8% (5)	2%	9% (5)	9% (5)
Trees	SAGO	0-10%				
	POFR2	0-5%				
Nonnative Species		0%				
Total Forbs		5%	5%	2%	6%	5%
Total Perennial Graminoids		80%	46%	40%	51%	48%
Total Shrubs		5-15%	49%	58%	44%	46%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	0%	0%
Similarity Index			63%	55%	62%	64%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 175. Utilization, Weighted Average, BLKROC_39

2007	**2008**	**2009**
9%	11%	9%

Table 176. Utilization by Species, BLKROC_39

	DISP
2007	9%
2008	11%
2009	9%

Table 177. Frequency (%), BLKROC_39

Life Forms	Species	2002	2003	2004	2007	2009
Perennial Forb	NIOC2	0	0	3	0	4
	SUMO	7	12	5	8	4
Perennial Graminoid	DISP	104	94	88	87	98
	JUBA	7	0	0	0	0
Shrubs	ALOC2	5	8	11	13	13
	ATCO	3	9	3	9	13
	ATTO	17	3	3	3	0
	ERNA10	0	4	0	1	0
	SAVE4	3	0	4	4	3
	SUMO	0	0	0	0	0
Nonnative	BAHY	0	2	0	0	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 178. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_39

Life Forms	Species	2002	2003	2004	2007	2009
Perennial Forb	NIOC2	0	0	T	0	T
	SUMO	T	0	0	0	0
Perennial Graminoid	DISP	3	3	3	4	3
	JUBA	T	0	0	0	0
Nonnative	BAHY	0	T	0	0	0

Table 179. Cover (m) Shrubs BLKROC_39

Species	2003	2004	2007	2009
ALOC2	0.1	0.2	0.0	0.0
ATCO	0.1	0.5	0.4	1.7
ATTO	3.4	1.9	2.4	1.3
ERNA10	0.1	0.0	0.3	0.0
SAVE4	1.4	0.0	0.1	0.0
SUMO	0.2	0.4	0.5	0.4
Total	5.3	3.0	3.6	3.5

Table 180. Ground Cover (%) BLKROC_39

Substrate	2002	2003	2004	2007	2009
Bare Soil	82	86	94	92	95
Dung	1	1	1	1	0
Litter	12	13	5	7	5
Rock	1	0	0	0	0
Standing Dead	0	0	0	0	2

Table 181. Shrub Densities and Age Classes BLKROC_39

	ATCO					ATTO					ERNA10	
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2002**	**2003**	**2004**	**2007**	**2009**	**2003**	**2007**
Seedling	1	0	5	2	0	4	10	9	0	1	0	0
Juvenile	1	0	2	10	0	0	2	11	0	0	1	2
Mature	0	6	1	2	1	5	14	9	4	6	0	1
Decadent	0	0	0	0	0	2	3	5	10	7	0	0
Total	2	6	8	14	1	11	29	34	14	14	1	3

Table 181. Continued.

	SAVE4					SUMO				
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2002**	**2003**	**2004**	**2007**	**2009**
Seedling	0	0	0	0	0	0	0	1	1	0
Juvenile	0	0	0	0	0	0	0	0	4	0
Mature	1	6	1	1	2	1	4	4	1	2
Decadent	0	0	0	0	0	0	2	0	1	0
Total	1	6	1	1	2	1	6	5	7	2

BLKROC_44

BLKROC_44 is located in an upland site in the Reservation Field. The soils are Manzanar-Winnedumah Association, 0-2% slopes, which corresponds to the Sodic Fan ecological site. Similarity index has ranged between 62-87%. Rubber rabbitbush frequency increased in 2009 but remained within baseline ranges. The site is static and in good condition. Utilization has been within the upland standards of 65% or less. Manzanar-Winnedumah soils will not support large amounts of perennial grass; therefore, burns on the soil types should not occur if the goal is to increase perennial grass production. The site is static and in excellent condition.

Table 182. Blackrock_44 Comparison to Sodic Fan Ecological Site

Ecological Site: Sodic Fan		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace-2%	2%			
Perennial Forbs	GLLE3	0-2%				
Other Perennial Forbs		0-2%	T	3%(2)	3%(2)	4%(2)
Perennial Graminoids	SPAI	10-20%	23%(20)	20%	19%	15%
	DISP	5-10%	19%(10)	15%(10)	17%(10)	21%(10)
	LECI	5-10%				
	JUBA	0-2%	1%	T	T	
Other Perennial Graminoids		0-2%				
Shrubs	ATTO	40-55%	57%(55)	47%	44%	33%
	SAVE4	5-15%				
	ATCO	2-5%				
	ERNA10	0-2%		14%(2)	16%(2)	26%(2)
	ARTRW8	0-2%				
	SUMO	0-2%				
Other Shrubs		0-10%				
Nonnative Species		0%				
Total Forbs		5%	2%	3%	3%	4%
Total Perennial Graminoids		25%	43%	35%	36%	36%
Total Shrubs		70%	57%	61%	60%	56%
Total Nonnative Species		0%				
Similarity Index			87%	81%	77%	62%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 183. Utilization, Weighted Average, BLKROC_44

2007	**2008**	**2009**
65%	28%	47%

Table 184. Utilization by Species, BLKROC_44

	DISP	**SPAI**
2007	57%	74%
2008	20%	36%
2009	34%	66%

Table 185. Frequency (%), BLKROC_44

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATPH	0	1	0	0	0
	ATSES	0	35	0	0	0
	CORA5	0	1	0	0	0
Perennial Forb	SUMO	3	7	7	8	15
Perennial Graminoid	DISP	104	96	104	113	114
	JUBA	20	14	16	7	11
	SPAI	80	87	83	83	82
Shrubs	ATTO	32	70	83	28	35
	ERNA10	17	30	32	10	24*
	SUMO	0	0	0	0	0
Nonnative	BAHY	0	1	0	0	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 186. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_44

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATPH	0	T	0	0	0
	ATSES	0	1	0	0	0
	CORA5	0	T	0	0	0
Perennial Forb	SUMO	T	0	0	0	0
Perennial Graminoid	DISP	6	7	5	7	4
	JUBA	T	T	T	T	T
	SPAI	11	13	8	7	5
Shrubs	ATTO	18	0	0	0	0
	ERNA10	7	0	0	0	0
	SUMO	0	0	0	0	0
Nonnative	BAHY	0	0	0	0	0

Table 187. Cover (m) Shrubs BLKROC_44

Species	2003	2004	2007	2009
ATTO	19.4	11.9	10.7	10.7
ERNA10	7.7	6.0	11.4	10.1
SUMO	1.4	0.9	1.8	0.2
Total	28.5	18.8	23.9	21.0

Table 188. Ground Cover (%) BLKROC_44

Substrate	2002	2003	2004	2007	2009
Bare Soil	36	34	48	49	45
Dung	2	1	1	1	1
Litter	35	55	49	51	54
Rock	0	0	0	0	0
Standing Dead	0	0	8	17	12

Table 189. Shrub Densities and Age Classes BLKROC_44

	ATTO					ERNA10					SUMO				
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2002**	**2003**	**2004**	**2007**	**2009**	**2002**	**2003**	**2004**	**2007**	**2009**
Seedling	1	942	364	0	0	0	0	3	0	0	0	7	9	0	0
Juvenile	6	250	146	27	0	5	9	4	2	0	1	10	10	17	1
Mature	13	41	29	21	39	4	21	23	29	26	0	8	23	6	17
Decadent	7	15	6	21	24	4	6	6	7	7	0	0	1	1	1
Total	27	1248	545	69	63	13	36	36	38	33	1	25	43	24	19

BLKROC_49

BLKROC_49 is located in an upland site in the Reservation Field. The soils are Mazourka Hard Substratum-Mazourka-Eclipse Complex, 0-2% slopes, which corresponds to the Sandy Terrace ecological site. The similarity index ranged between 14%-38% during the baseline period. The poor similarity index was a result of having too much saltgrass and alkali sacaton in the plant community composition. Sandy Terrace ecological sites are shrub dominant sites with low annual aboveground biomass production. The ecological site description does not account for instances with large abundances of perennial grasses. Similar to the Sodic Fan sites, the existing plant community may more closely match management goals than the described potential for a site. Frequency values were static in 2009. Utilization on this upland pasture was minimal for all three years.

Table 190. BLKROC_49 Comparison to Sandy Terrace Ecological Site

Ecological Site: Sandy Terrace		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 5%				
Perennial Forbs	STEPH	0-2%	2%	2%	4% (2)	
Other Perennial forbs		0-5%			7% (5)	
Perennial Graminoids	ORHY	10-20%				
	DISP	0-2%	62% (2)	50% (2)	36% (2)	22% (2)
	SPAI	0-2%	27% (2)	26% (2)	26% (2)	24% (2)
Other Perennial Graminoids		0-5%				
Shrubs	ATCO	20-30%	5%	4%		3%
	MESP2	10-20%				
	SAVE4	5-15%	1%	8%	8%	20% (15)
	EPNE	2-5%				
	ARSP5	2-5%				
	KRCE2	2-5%				
	ARTRW8	2-5%				
	TETRA3	0-3%				
	ATCA	0-3%				
	GRSP	0-3%				
	PSPO	0-3%				
	PSAR4	0-3%				
Other Shrubs		0-15%	2%	11%	19% (15)	31% (15)
Nonnative Species		0%				
Total Forbs		10%	2%	2%	11%	0%
Total Perennial Graminoids		25%	89%	77%	63%	46%
Total Shrubs		65%	8%	22%	26%	54%
Total Nonnative Species		0%	0%	0%	0%	0%
Similarity Index			14%	29%	34%	38%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 191. Utilization, Weighted Average, BLKROC_49

2007	**2008**	**2009**
42%	13%	13%

Table 192. Utilization by Species, BLKROC_49

	DISP	SPAI
2007	22%	69%
2008	9%	19%
2009	10%	19%

Table 193. Frequency (%), BLKROC_49

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ERIAS	0	3	0	0	0
	PSRA	0	0	2	0	1
Perennial Forb	OENOT	0	3	0	0	0
	STEPH	5	2	17	0	0
	STPA4	0	0	0	6	3
Perennial Graminoid	DISP	78	56	63	53	52
	SPAI	29	24	25	27	29
Shrubs	ATCO	20	15	19	21	30
	ATPA3	3	4	1	0	1
	ERNA10	14	10	7	4	10
	SAVE4	3	0	4	2	4

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 194. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_49

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ERIAS	0	T	0	0	0
	PSRA	0	0	T	0	0
Perennial Forb	OENOT	0	T	0	0	0
	STEPH	T	T	T	0	0
	STPA4	0	0	0	T	T
Perennial Graminoid	DISP	3	4	2	1	2
	SPAI	2	3	2	2	2

Table 195. Cover (m) Shrubs BLKROC_49

Species	2003	2004	2007	2009
ATCO	0.4	0.0	0.2	0.7
ERNA10	1.1	1.1	2.3	1.7
MACA2	0.0	0.6	0.0	0.0
SAVE4	1.0	0.6	1.9	1.4
Total	2.5	2.3	4.4	3.8

Table 196. Ground Cover (%) BLKROC_49

Substrate	2002	2003	2004	2007	2009
Bare Soil	76	83	93	89	90
Dung	1	0	0	1	0
Litter	15	12	6	5	10
Rock	3	0	0	5	0
Standing Dead	0	0	5	2	5

Table 197. Shrub Densities and Age Classes BLKROC_49

	ATCO					ATPA3			ATTO
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2003**	**2004**	**2007**	**2002**
Seedling	0	1	2	1	1	0	0	0	0
Juvenile	0	6	11	31	6	0	1	6	0
Mature	2	10	6	5	31	2	1	0	0
Decadent	3	6	5	2	5	1	1	1	1
Total	5	23	24	39	43	3	3	7	1

Table 197. continued.

	SAVE4					SUMO	ERNA10				MACA2	
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2009**	**2002**	**2003**	**2004**	**2007**	**2009**	**2004**
Seedling	0	0	0	0	0	0	2	0	0	0	0	0
Juvenile	0	3	4	3	0	0	2	6	8	10	0	0
Mature	0	0	1	2	1	1	2	1	3	7	6	1
Decadent	1	2	3	3	2	0	0	1	0	3	2	0
Total	1	5	8	8	3	1	6	8	11	20	8	1

BLKROC_51

BLKROC_51 is located in an upland site in the Reservation Field. The soils are Winnedumah Silt Loam, 0-2% slopes, which corresponds to the Sodic Fan ecological site. The similarity index for the site during baseline period ranged between 46-78%. The site has a higher grass component and lower shrub component than expected for Sodic Fan site, thus lowering the similarity index. This current condition of the site is more desirable than that described by Sodic Fan ecological site. Perennial grass frequency decreased in 2009 when compared to 2007 but remained within baseline parameters. Utilization has been within upland standards for the past two years.

Table 198. BLKROC_51 Comparison to Sodic Fan Ecological Site

Ecological Site: Sodic Fan		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	0%				
Perennial Forbs	GLLE3	0-2%	29% (2)	2%	18% (2)	15% (2)
Other Perennial Forbs		0-2%				
Perennial Graminoids	SPAI	10-20%	12%	9%	18%	13%
	DISP	5-10%	37% (10)	28% (10)	33% (10)	24% (10)
	LECI	5-10%				
	JUBA	0-2%				
Other Perennial Graminoids		0-2%				
Shrubs	ATTO	40-55%	22%	58% (55)	30%	38%
	SAVE4	5-15%				1%
	ATCO	2-5%				
	ERNA10	0-2%		3% (2)	2%	10% (2)
	ARTRW8	0-2%				
	SUMO	0-2%				
Other Shrubs		0-10%				
Nonnative Species		0%				
Total Forbs		5%	29%	2%	18%	15%
Total Perennial Graminoids		25%	49%	37%	51%	36%
Total Shrubs		70%	22%	62%	32%	48%
Total Nonnative Species		0%	0%	0%	0%	0%
Similarity Index			46%	78%	62%	66%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 199. Utilization, Weighted Average, BLKROC_51

2007	**2008**	**2009**
72%	46%	49%

Table 200. Utilization by Species, BLKROC_51

	DISP	**SPAI**
2007	64%	80%
2008	29%	64%
2009	26%	78%

Table 201. Frequency (%), BLKROC_51

Life Forms	Species	2002	2003	2004	2007	2009
Perennial Forb	GLLE3	32	2	12	27	8**
	SUMO	0	0	0	2	0
Perennial Graminoid	DISP	100	85	70	114	73**
	SPAI	34	21	27	45	18**
Shrubs	ALOC2	0	0	0	1	0
	ATTO	15	56	42	38	8**
	ERNA10	9	2	0	11	1*

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 202. Cover (%) Forbs, Graminoids, Sub-shrubs BLKROC_51

Life Forms	Species	2002	2003	2004	2007	2009
Perennial Forb	GLLE3	10	1	5	6	6
	SUMO	0	0	0	0	0
Perennial Graminoid	DISP	12	13	7	8	5
	SPAI	6	6	6	6	3

Table 203. Cover (m) Shrubs BLKROC_51

Species	2003	2004	2007	2009
ATTO	25.9	6.2	11.8	7.9
ERNA10	2.1	0.5	4.1	4.1
SAVE4	0.0	0.0	0.4	0.3
Total	28.0	6.8	16.3	12.3

Table 204. Ground Cover (%) BLKROC_51

Substrate	2002	2003	2004	2007	2009
Bare Soil	31	47	60	53	49
Dung	2	2	1	1	0
Litter	42	48	34	47	51
Rock	0	0	0	0	0
Standing Dead	0	0	13	16	10

Table 205. Shrub Densities and Age Classes BLKROC_51

	ATTO					ERNA10					SAVE4		
Age Class	2002	2003	2004	2007	2009	2002	2003	2004	2007	2009	2004	2007	2009
Seedling	1	1434	21	0	13	1	0	0	0	0	0	0	0
Juvenile	3	285	103	23	15	2	3	2	0	0	1	0	0
Mature	7	15	17	44	19	2	3	4	5	5	0	2	2
Decadent	11	8	25	19	14	0	0	0	0	0	2	1	1
Total	22	1742	166	86	61	5	6	6	5	5	3	3	3

Irrigated Pastures

There are no irrigated pastures on the Blackrock Lease.

Stock Water Sites

There are five identified water sites needed for the Blackrock Lease. These sites have been located and approved for drilling and installation. The wells for three of the sites, the Reservation Riparian, North Riparian, and South Riparian Fields have already been drilled. The remaining two wells in the White Meadow Field and Reservation Field are out to bid for a private contractor to drill them. There are also three other stock water sites that will be developed as part of the MOU required 1600 Acre-Foot Mitigation Projects. The "North of Mazourka Project" will provide stock water in the Reservation Field and the "Well 368/Homestead Project" will provide stock water in the Little Robinson Field and East Robinson Field. These mitigation projects are scheduled to be completed in 2010.

Fencing

Fencing projects on the Blackrock Lease comprise most of the new fencing in the LORP area. Fencing of riparian management areas along the west side of the river and south of Mazourka Canyon Road were completed along with an exclosure that was built around Well 368 to allow for management flexibility of Owens Pupfish habitat. Modifications were also made to the riparian fencing in order to improve access for recreation. These changes include installing cattleguards and widening walk-throughs. A drift fence south of Well 368 has also been completed. The purpose of this drift fence is to control cattle movement in the riparian area by dividing the North Riparian Field into the North Riparian Field and the South Riparian Field.

The Blackrock Lease had two 0.25-acre rare plant exclosures built in the Robinson and Little Robinson Pastures and two riparian exclosures were constructed in the White Meadow Riparian and Wrinkle Riparian Fields. An additional fence in the White Meadow Field was also constructed due to the grazing prescriptions placed on the Winterton Unit of the BWMA during periods of flooding.

During the 2009 RAS it was noted that there was a section of riparian fence cut (north of Manzanar Reward Road). The fence that was vandalized to allow access was cut to allow access to one of the old roads that leads down to the floodplain. LADWP staff believes that this was a one time occurrence due to the lack of any other vandalism to the fences since they were constructed in 2006. The fence will be repaired by the lessee before livestock enter the pasture again.

A 1.5-mile section of the lease boundary fence was reconstructed in February 2009. This was necessary because a prescribed fire destroyed the boundary fence between the Blackrock and Twin Lakes Leases.

Results Rare Plant

Little Robinson Pasture Blackrock Lease

This pasture contains a *S. covillei* population. Trend plots Little Robinson 1EX and Little Robinson 2EX occur within an exclosure; plots Little Robinson 1C and Little Robinson 2C are adjacent to the exclosure. The pasture was grazed during the 2009 season. Phenology included individuals that were in bud to individuals that had already set seed.

Table 206. Little Robinson Pasture Blackrock Lease

Plot Number	Species	Seedling	Juvenile	Mature	Total
Little Robinson 1C	*S. covillei*	0	12	28	40
Little Robinson 2C	*S. covillei*	0	12	19	31
Little Robinson 1EX	*S. covillei*	0	0	40	40
Little Robinson 2EX	*S. covillei*	0	6	23	29

Robinson Pasture Blackrock

This pasture contains a *S. covillei* population and a *C. excavatus* population. Trend plots Robinson 1EX and Robinson 2EX occur within an exclosure capturing both *C. excavatus* and *S. covillei* species for use in tracking trends of both species. Two *S. covillei* trend plots, Robinson 1C and Robinson 2C along with one *C. excavatus* trend plot, Robinson 3C are outside the exclosure within the same pasture. The pasture was grazed with end-of-season utilization at 17%. Phenology included individuals that were in bud to individuals that had already set seed. The overall phenology was late with most individuals flowering or setting seed.

Table 207. Robinson Pasture Blackrock Lease

Plot Number	Species	Seedling	Juvenile	Mature	Total
Robinson 1C	*C. excavatus*	0	0	12	12
Robinson 1C	*S. covillei*	0	0	6	6
Robinson 2C	*C. excavatus*	0	0	0	0
Robinson 2C	*S. covillei*	0	4	59	63
Robinson 3C	*C. excavatus*	0	0	1	1
Robinson 1EX	*C. excavatus*	0	0	2	2
Robinson 1EX	*S. covillei*	0	43	35	78
Robinson 2EX	*C. excavatus*	0	0	0	0
Robinson 2EX	*S. covillei*	0	0	23	23

Salt and Supplement Sites

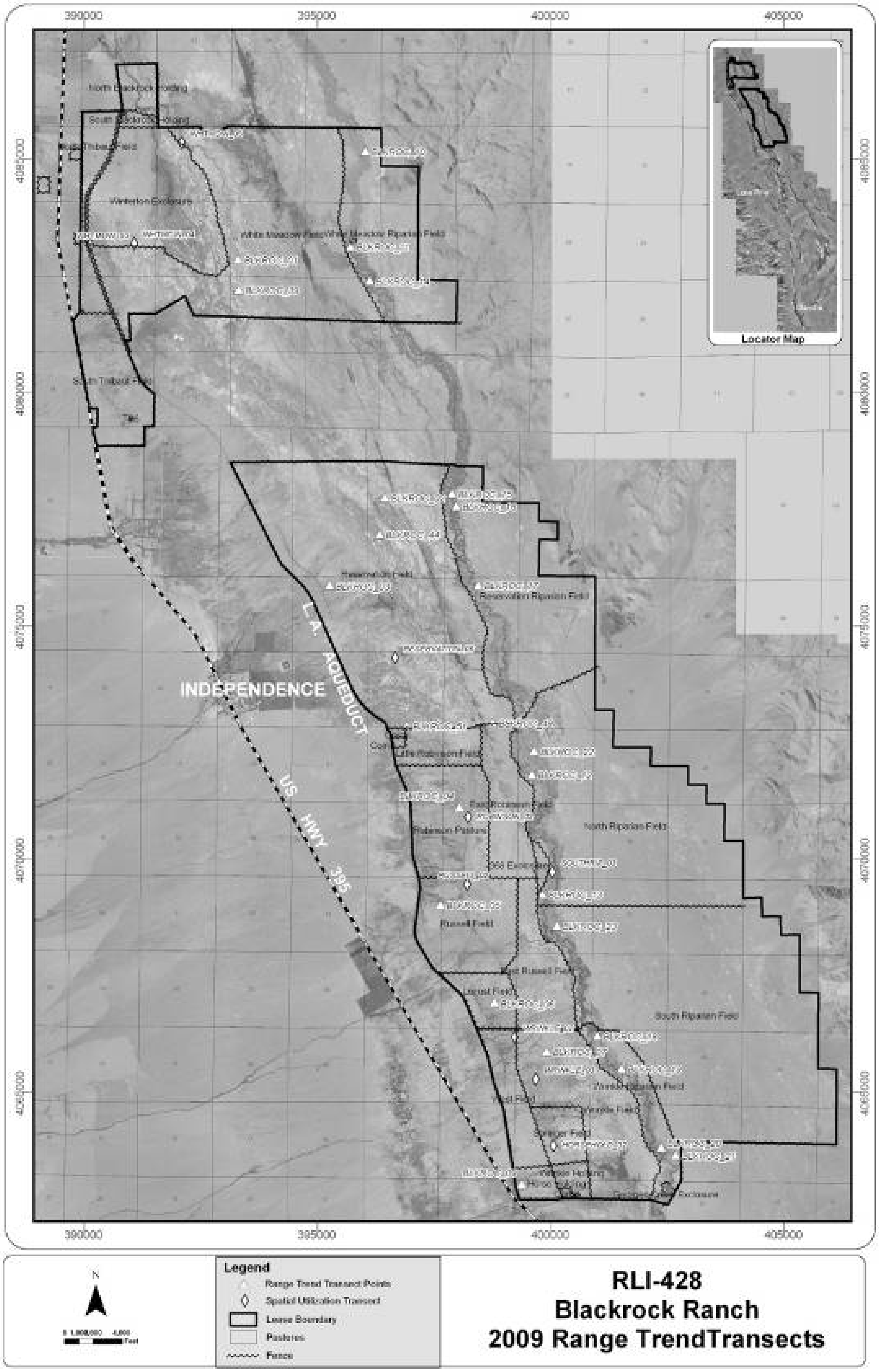
Many of the supplement sites located on the Blackrock Lease have been in place for many years and are located in upland management areas. Some of these sites have been moved in order to adapt to the installation of new fencing. These new locations were selected as to better distribute cattle within and near the newly created riparian pastures.

Burning

There were several prescribed burns conducted on the Blackrock Lease in 2009. The largest burn was the prescribed burn of the Waggoner Unit of the BWMA. The burn was conducted in order to remove dense stands of decadent tules and shrubs prior to flooding. The burning and subsequent flooding not only improved the area for waterfowl and shorebirds by creating open water habitat, but improved the area for grazing by production of palatable forage series.

The lessee burned two small range burns that consisted of brush piles and adjacent shrubs. All of the burns totaled approximately 20 acres and they were in sites that had a good perennial grass understory. These burns produced an increase in perennial grasses and improved the areas in which they occurred.

The Winterton Unit and continued slash pile burning along the river are planned for the Blackrock Lease in 2010. Burning of the Winterton Unit will remove the solid stands of decadent tules and cattails and also the dense shrubs on the adjacent uplands. This burn will improve grazing for the lessee and also provide improved waterfowl and shorebird habitat by creating open water areas when the site is flooded again.



Land Use Figure 3. Blackrock Lease RLI-428, Range Trend Transect Locations

6.7.4. Thibaut Lease (RLI-430)

The 5,259-acre Thibaut Lease is leased to three lessees for wintering pack stock. The lease historically was grazed as one large pasture by mules and horses. Since the implementation of the LORP and installation of new fencing, four different management areas have been created on the lease. These areas are the Waterfowl Management Area, Rare Plant Management Area, Thibaut Field, and the Thibaut Riparian Exclosure. Management differs among these areas. The Waterfowl Management Area can be grazed every other year. The 2008-09 was an off year and the area was flooded for waterfowl habitat. However, if it is an "on" year when water is released for waterfowl habitat, the utilization standard will be 40%. The Rare Plant Management area can be grazed every year from October 1 to March 1with a maximum of 65% utilization. From March 1 to September 30, the area is excluded from grazing in order to allow the Owens Valley checkerbloom (*Sidalcea covillei*) to complete its lifecycle. The Thibaut Field includes a small area of irrigated pasture near the corrals at the northwest portion of the pasture while the majority of remaining portion contains both upland areas and the bulk of the Thibaut Unit. The irrigated pasture portion will be assessed using pasture condition scoring. Wetland areas of the Thibaut Pasture will be subject to the 40% use standard when the Unit is flooded and the upland standard when the unit is dry. The Riparian Exclosure has been excluded from grazing for 10 years.

<u>Summary of Utilization</u>

The following tables present the summarized utilization data for each pasture, for the transects in each pasture, and by species for each transect for the current year.

Table 1. End of Grazing Season Utilization for Pastures on the Thibaut Lease, RLI-430, 2009

Rare Plant Management Area	55%
Thibaut Pasture	25%

Table 2. End of Grazing Season Utilization for Transects on the Thibaut Lease, RLI-430, 2009

Rare Plant Management Area	RAREPLANT_02	69%
	THIBAUT_02	46%
	RAREPLANT_03	53%
Thibaut Pasture	THIBAUT_03	37%
	THIBAUT_08	10%
	THIBAUT_09	13%
	THIBAUTFIELD_02	62%
	THIBAUTFIELD_03	13%
	THIBAUTFIELD_04	10%

Table 3. Utilization at Each Transect at the Species Level, Thibaut Lease, End of Grazing Season, 2009

Pasture	Transect	DISP	SPAI	SPGR
Rare Plant Management Area	RAREPLANT_03	69%	49%	
	RAREPLANT_02	79%	63%	
	THIBAUT_02	40%	50%	
Thibaut Pasture	THIBAUT_03	33%	40%	
	THIBAUT_08	10%	10%	7%
	THIBAUT_09	13%		
	THIBAUTFIELD_02	63%	62%	
	THIBAUTFIELD_03	5%	20%	
	THIBAUTFIELD_04	13%	4%	

In 2009, the Thibaut Unit was not being flooded therefore upland management use standards applied to both the Thibaut Pasture and the Rare Plant Management Area. Both the Thibaut Pasture (25%) and Rare Plant Management Area (55%) met allowable use levels for upland pastures. Livestock have typically concentrated their activity in the western and northern portions of the Thibaut Pasture. The new fencing for the Rare Plant Management Area created a barrier to movement and concentrating use through this area in the vicinity of the new fence. There were attempts by the lessee this spring to improve distribution and shift more use to the Thibaut Pasture by moving grazing pressure further east, away from the division fence between the two pastures.

2010 Grazing Season

The table below presents targeted stubble heights (inches) by key species for the 2010 grazing season. These measurements are intended to be used throughout the grazing season to help gauge the utilization on the lease. The 2010 not-to-exceed stubble height is based on the ungrazed height of key forage species on the lease.

Table 4. Target Stubble Heights (inches) for Key Species by Pasture, Thibaut Lease

Pasture	DISP	SPAI	SPGR
Rare Plant Management Area	2	5	
Thibaut Pasture	2	4	
Waterfowl Management Area	3		

Summary of Range Trend Data and Conditions

Monitoring site photos are presented in Appendix 3 – Section 4. The three range trend sites on the Saline Meadow ecological sites were in good to excellent condition. The range trend transects in the riparian section on the Moist Floodplain ecological sites; all located in the historical dry reach of the river were in low similarity to the potential for Moist Floodplain ecological sites. The two remaining sites, THIBAUT_08 and THIBAUT_09 on the Saline Bottom ecological sites were only sampled once during the baseline period in 2007 when they were established and were from 64 and 26%, respectively. Frequency data significantly differed in 2009 outside of baseline sampling ranges on THIBAUT_01A with an increase in Baltic rush, likely influenced by the water additions into Thibaut Ponds in this field. On two of the four range trend sites in the former dry reach (THIBAUT_05 and THIBAUT_06) native perennial herbaceous plants significantly increased beyond previous levels. Saltgrass frequency also significantly increased on THIBAUT_06. These increases in pioneering species are encouraging signs that early plant succession processes have begun in these areas. No grazing occurred in the Riparian Exclosure. Utilization levels have been historically high, except in the western half of the lease, but the increased production from the flooding of the Thibaut Unit has helped the lessees meet management guidelines. Utilization levels have been within the standards set for management area type.

Table 5. Similarity Indices During Baseline Period with Mean Value for Each Transect

Ecosite/Transect	2002	2003	2004	2005	2006	2007	MEAN
Saline Meadow							
THIBAUT_01/01A	68%	73%	75%			56%	68%
THIBAUT_02	100%	91%	95%			97%	96%
THIBAUT_03	73%	92%	71%			85%	80%
Moist Floodplain							
THIBAUT_04	3%	3%	3%			3%	3%
THIBAUT_05		3%	3%			3%	3%
THIBAUT_06	10%	13%	12%			16%	13%
THIBAUT_07	5%	5%	5%			5%	5%
Saline Bottom							
THIBAUT_08						64%	64%
THIBAUT_09						26%	26%

THIBAUT_01A

THIBAUT_01A is located in the Waterfowl Management Area. The soils are Shondow Loam, 0-2% slopes, which corresponds to the Saline Meadow ecological site. The similarity index during the baseline period ranged between 56-75%. Variation in the similarity index was driven by changes in graminoid production with the exception of saltgrass which exceeded allowable amounts for what is described as typical for a Saline Meadow ecological site. Significant increases in borax weed (*Nitrophila occidentalis* [NIOC2]) and Baltic rush frequencies were observed in 2009. Inkweed was absent in 2009. The Waterfowl Management Area was not grazed last year as per the management plan and utilization estimates will be conducted for the 2010 grazing season. Due to new fences, in 2007 the starting point for the original transect THIBAUT_01 was swung out to become the end point for THIBAUT_1A. Frequency, cover, ground cover and density data are presented for 2007 and 2009 only, however similarity indices from 2002 to 2007 are presented because the data collected on the original transect can be inferred across the broader area, which would encompass THIBAUT_1A. The Waterfowl Management Area was flooded in 2008 and in an off year in 2009 and was not grazed by livestock, no utilization estimates were made on the transect.

Table 6. THIBAUT_01A Comparison to Saline Meadow Ecological Site

Ecological Site: Saline Meadow		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%		T		
Perennial Forbs	ANCA10	0-2%	5% (2)	7% (2)	7% (2)	
	CALI4	0-2%				
	PYRA	0-2%	3% (2)	3% (2)	1%	
Other Perennial Forbs		0-2%	3% (2)	5% (2)	3% (2)	8% (2)
Perennial Graminoids	DISP	25-50%	73% (50)	63% (50)	52% (50)	89% (50)
	SPAI	25-50%	4%	5%	8%	2%
	JUBA	5-15%	1%	8%	10%	1%
	LETR5	5-10%	3%	2%	T	T
	CAREX	0-2%	2%	4% (2)	T	
	POSE	0-2%				
	LECI	0-2%				
Other Perennial Graminoids		0-2%	5% (2)		11% (2)	
Shrubs	ATTO	0-5%				
	ERNA10	0-5%				
	ROWO	0-5%				
	SALIX	0-5%				
	SAVE4	0-5%				
Other Shrubs		0-5%				1%
Trees	SAGO	0-10%				
	POFR2	0-5%				
Nonnative Species		0%	2%	2%	7%	
Total Forbs		5%	11%	15%	12%	8%
Total Perennial Graminoids		80%	87%	83%	81%	92%
Total Shrubs		5-15%	0%	0%	0%	1%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	2%	2%	7%	0%
Similarity Index			68%	73%	75%	56%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 7. Frequency (%), THIBAUT_01A

Life Forms	Species	2007	2009
Annual Forb	CLEOM2	0	2
Perennial Forb	NIOC2	16	38**
	PYRA	13	5
	SUMO	11	0
Perennial Graminoid	DISP	140	132
	JUBA	12	74**
	LETR5	8	0
	SPAI	1	8
Shrubs	MACA17	13	0**

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 8. Cover (%) Forbs, Graminoids, Sub-shrubs THIBAUT_01A

Life Forms	Species	2007	2009
Annual Forb	CLEOM2	0	T
Perennial Forb	NIOC2	1	4
	PYRA	T	T
	SUMO	0	0
Perennial Graminoid	DISP	34	27
	JUBA	T	3
	LETR5	T	0
	SPAI	1	1
Shrubs	MACA17	1	0

Table 9. Cover (%) Shrubs THIBAUT_01A

Species	2007	2009
SUMO	2	0
Total	2	0

Table 10. Ground Cover (%) THIBAUT_01A

Substrate	2007	2009
Bare Soil	49	66
Dung	2	1
Litter	49	33

Table 11. Shrub Densities and Age Classes THIBAUT_01A

	SUMO	
Age Class	2007	2009
Juvenile	17	0
Mature	40	0
Decadent	2	0
Total	59	0

THIBAUT_02

THIBAUT_02 is located in the Rare Plant Management Area which will be managed as an upland pasture. The soils are Shondow Loam with 0-2% slopes, which correspond to the Saline Meadow ecological site. The similarity index varied between 91-100% during the baseline sampling due to high frequencies of DISP, SPAI, and low shrub components. Despite the high similarity index, production at the site for the soil type appears low. Baltic rush and rubber rabbitbush frequency decreased in 2009 compared to values in 2007. Shrub density and canopy cover has not changed.

Table 12. THIBAUT_02 Comparison to Saline Meadow Ecological Site

Ecological Site: Saline Meadow		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%		7% (2)		
Perennial Forbs	ANCA10	0-2%				
	CALI4	0-2%				
	PYRA	0-2%	1%	1%		1%
Other Perennial Forbs		0-2%		1%	1%	
Perennial Graminoids	DISP	25-50%	48%	44%	42%	39%
	SPAI	25-50%	50%	38%	48%	54% (50)
	JUBA	5-15%	1%	0%	1%	2%
	LETR5	5-10%				
	CAREX	0-2%				
	POSE	0-2%				
	LECI	0-2%				
Other Perennial Graminoids		0-2%				
Shrubs	ATTO	0-5%			2%	
	ERNA10	0-5%		9% (5)	1%	5%
	ROWO	0-5%				
	SALIX	0-5%				
	SAVE4	0-5%				
Other Shrubs		0-5%				
Trees	SAGO	0-10%				
	POFR2	0-5%				
Nonnative Species		0%		T	5%	
Total Forbs		5%	1%	9%	1%	1%
Total Perennial Graminoids		80%	99%	82%	90%	94%
Total Shrubs		5-15%	0%	9%	3%	5%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	5%	0%
Similarity Index			100%	91%	95%	97%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 13. Utilization, Weighted Average, THIBAUT_02

	DISP	**SPAI**
2007	72%	85%
2009	40%	50%

Table 14. Utilization by Species, THIBAUT_02

2007	2009
78%	46%

Table 15. Frequency (%), THIBAUT_02

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATSES	0	47	5	0	0
	CHENO	0	33	0	0	0
	CHHI	0	23	3	0	0
	COMAC	0	23	0	0	0
	CORA5	0	9	0	0	0
Perennial Forb	ASTRA	0	0	4	1	0
	GLLE3	0	7	9	3	2
	PYRA	5	10	3	12	8
	SUMO	0	1	0	0	0
Perennial Graminoid	DISP	155	153	154	159	151
	JUBA	14	15	9	16	1**
	SPAI	139	132	137	140	139
Shrubs	ATTO	0	2	10	2	3
	ERNA10	7	8	13	18	8*
Nonnative Species	BAHY	0	16	39	0	3

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 16. Cover (%) Forbs, Graminoids, Sub-shrubs THIBAUT_02

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATSES	0	1	T	0	0
	CHENO	0	1	0	0	0
	CHHI	0	1	T	0	0
	COMAC	0	1	0	0	0
	CORA5	0	T	0	0	0
Perennial Forb	ASTRA	0	0	T	T	0
	GLLE3	0	T	T	T	T
	PYRA	T	T	T	T	T
	SUMO	0	0	0	0	0
Perennial Graminoid	DISP	8	18	8	6	9
	JUBA	T	T	T	T	T
	SPAI	12	24	14	13	16
Shrubs	ATTO	0	0	0	0	0
	ERNA10	2	0	0	0	0
Nonnative Species	BAHY	0	T	1	0	T

Table 17. Cover (%) Shrubs THIBAUT_02

Species	2003	2004	2007	2009
ATTO	0	0	0	1
ERNA10	5	0	1	0
Total	5	1	1	1

Table 18. Ground Cover (%) THIBAUT_02

Substrate	2002	2003	2004	2007	2009
Bare Soil	41	30	63	45	78
Dung	8	11	6	2	1
Litter	34	47	26	51	22
Rock	0	0	0	0	0
Standing Dead	0	0	0	0	T

Table 19. Shrub Densities and Age Classes THIBAUT_02

	ATTO	ERNA10				
Age Class	2004	2002	2003	2004	2007	2009
Juvenile	4	0	5	8	0	1
Mature	1	1	9	13	7	11
Decadent	0	2	1	0	0	1
Total	5	3	15	21	7	13

THIBAUT_03

THIBAUT_03 is located in the upland Thibaut Pasture. The soils are Shondow Loam, 0-2% slopes, corresponding to the Saline Meadow ecological site. Similarity indices ranged between 71-92% during baseline sampling due to high frequencies of SPAI, DISP, and low shrub cover. Although the similarity index is high for this site, production seems lower than expected for the Saline Meadow. Saltgrass frequency increased in 2009 compared to 2007 but remained within typical range of variability observed during previous sampling periods.

Table 20. THIBAUT_03 Comparison to Saline Meadow Ecological Site

Ecological Site: Saline Meadow		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%		5% (2)		
Perennial Forbs	ANCA10	0-2%				
	CALI4	0-2%				
	PYRA	0-2%				
Other Perennial Forbs		0-2%	29% (2)	2%	25 (2)%	17% (2)
Perennial Graminoids	DISP	25-50%	24%	31%	16%	40%
	SPAI	25-50%	46%	50%	47%	37%
	JUBA	5-15%	1%	2%	1%	1%
	LETR5	5-10%				
	CAREX	0-2%				
	POSE	0-2%				
	LECI	0-2%				
Other Perennial Graminoids		0-2%				
Shrubs	ATTO	0-5%	T			
	ERNA10	0-5%		11% (5)	12% (5)	5%
	ROWO	0-5%				
	SALIX	0-5%				
	SAVE4	0-5%				
Other Shrubs		0-5%				T
Trees	SAGO	0-10%				
	POFR2	0-5%				
Nonnative Species		0%				
Total Forbs		5%	29%	7%	25%	17%
Total Perennial Graminoids		80%	71%	83%	64%	78%
Total Shrubs		5-15%	0%	11%	12%	5%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	0%	0%
Similarity Index			73%	92%	71%	85%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 21. Utilization, Weighted Average, THIBAUT_03

2007	**2008**	**2009**
78%	65%	37%

Table 22. Utilization, Weighted Average, THIBAUT_03

	DISP	SPAI
2007	74%	83%
2008	55%	75%
2009	33%	40%

Table 23. Frequency (%), THIBAUT_03

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATSES	0	17	0	0	0
	CHENO	0	0	0	0	0
	CHHI	0	2	0	0	0
	CORA5	0	15	2	0	0
Perennial Forb	GLLE3	51	26	37	34	26
	PYRA	0	0	0	0	2
	STEPH	3	7	13	0	0
Perennial Graminoid	DISP	128	147	139	121	149**
	JUBA	15	14	5	11	9
	SPAI	136	141	149	133	140
Shrubs	ATTO	2	5	11	0	3
	ERNA10	12	16	36	10	5
	MACA17	0	0	0	7	5
	SAEX	0	0	0	5	0
Nonnative Species	BAHY	0	0	0	0	2
	SATR12	0	0	0	0	3

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 24. Cover (%) Forbs, Graminoids, Sub-shrubs THIBAUT_03

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATSES	0	1	0	0	0
	CHENO	0	T	0	0	0
	CHHI	0	0	0	0	0
	CORA5	0	T	T	0	0
Perennial Forb	GLLE3	11	1	6	8	1
	PYRA	0	0	0	0	T
	STEPH	T	T	T	0	0
Perennial Graminoid	DISP	8	14	3	16	7
	JUBA	T	1	T	T	T
	SPAI	22	34	15	23	9
Shrubs	ATTO	T	0	0	0	0
	ERNA10	1	0	0	0	0
	MACA17	0	0	0	T	T
	SAEX	0	0	0	0	0
Nonnative Species	BAHY	0	0	0	0	T
	SATR12	0	0	0	0	T

Table 25. Cover (%) Shrubs THIBAUT_03

Species	2003	2004	2007	2009
ERNA10	6	3	3	2
Total	6	3	3	2

Table 26. Ground Cover (%) THIBAUT_03

Substrate	2002	2003	2004	2007	2009
Bare soil	30	18	47	24	65
Dung	4	5	3	3	1
Litter	43	63	47	73	34
Rock	T	T	0	T	0
Standing dead	0	0	1	1	1

Table 27. Shrub Densities and Age Classes THIBAUT_03

	ATTO			ERNA10				
Age Class	**2003**	**2004**	**2007**	**2002**	**2003**	**2004**	**2007**	**2009**
Juvenile	1	7	0	10	14	4	2	0
Mature	0	0	1	1	6	6	10	5
Decadent	0	0	0	4	6	4	1	7
Total	1	7	1	15	26	14	13	12

THIBAUT_04

THIBAUT_04 is in a riparian management area in the Thibaut Riparian Exclosure. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. This site is located in the historical 'dry reach' of the Owens River. Similarity indices were consistently at 3%, with community composition dominated by Nevada saltbush and nonnative fivehorn smotherweed and Russian thistle. Frequency in 2009 did not change from 2007. Tamarisk slash piles were burned at this site in 2008. As with all other floodplain areas in the former dry reach, fivehorn smotherweed covered the site in 2008. No new growth of fivehorn smotherweed was noted in 2009, but the site remained covered by decadent stands of this weed. There is no evidence in the dataset that return flows have influenced the adjacent moist floodplain sites. Livestock are currently excluded from the Thibaut Riparian Pasture.

Table 28. THIBAUT_04 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%				
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%				
	HECU3	0-2%				
Other Perennial Forbs		0-2%				
Perennial Graminoids	DISP	40-60%				
	SPAI	10-20%				
	LETR5	5-15%				
	JUBA	5-10%				
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	100% (3)	81% (3)	79% (3)	100% (3)
	ERNA10	0-3%				
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%				
Other Shrubs	SSSS	0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species	NONA	0%		19%	21%	0%
Total Forbs		5-10%	0%	0%	0%	0%
Total Perennial Graminoids		80%	0%	0%	0%	0%
Total Shrubs		5-15%	100%	81%	79%	100%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	19%	21%	0%
Similarity Index			3%	3%	3%	3%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 29. Frequency (%), THIBAUT_04

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATTR	0	0	15	0	0
	CHHI	0	7	5	0	0
Perennial Forb	MALE3	0	0	5	0	0
Shrubs	ATTO	9	13	19	37	43
Nonnative Species	BAHY	0	2	30	0	0
	SATR12	0	10	15	0	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 30. Cover (%) Forbs, Graminoids, Sub-shrubs THIBAUT_04

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATTR	0	0	T	0	0
	CHHI	0	0	T	0	0
Perennial Forb	MALE3	0	0	T	0	0
Nonnative Species	BAHY	0	1	1	0	0
	SATR12	0	2	T	0	0

Table 31. Cover (%) Shrubs THIBAUT_04

Species	2003	2004	2007	2009
ATTO	10	7	35	47
Total	10	7	35	47

Table 32. Ground Cover (%) THIBAUT_04

Substrate	2002	2003	2004	2007	2009
Bare Soil	8	12	11	16	0
Dung	0	1	1	T	0
Litter	0	87	88	84	100
Rock	0	0	0	0	0
Standing Dead	0	0	19	2	16
TARA Slash	0	0	3	1	0

Table 33. Shrub Densities and Age Classes THIBAUT_04

	ATTO				
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**
Seedling	0	2	0	0	0
Juvenile	3	6	15	3	1
Mature	4	17	9	39	56
Decadent	0	3	1	34	0
Total	7	28	25	76	57

THIBAUT_05

THIBAUT_05 is in a riparian management area in the Thibaut Riparian Exclosure. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0 to 2% slopes, which corresponds to the Moist Floodplain ecological site. This site is located in the historical 'dry reach' of the Owens River. The similarity index has remained at 3% during baseline sampling. Frequency in 2009 indicated an increase salt heliotrope (*Heliotropium curassavicum* [HECU3]) and alkali mallow (*Malvella leprosa* [MALE3]) two native perennials. There has been a small amount of saltgrass observed on the transect in 2007 and 2009 though there was no difference between years. The increase of these early seral forbs and the presence of some perennial grass are encouraging signs that return flows may be initiating successional changes on the site. As with all other floodplain areas in the former dry reach, fivehorn smotherweed covered the site in 2008. No new growth of fivehorn smotherweed was noted in 2009, but the site remained covered by decadent stands of this weed. Livestock are currently excluded from the Thibaut Riparian Exclosure.

Table 34. THIBAUT_05 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**			
Functional Group	**Species**	**Site Potential**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%			
Perennial Forbs	PYRA	0-2%			
	NIOC2	0-2%			
	SUMO	0-2%			
	HECU3	0-2%			
Other Perennial Forbs		0-2%			
Perennial Graminoids	DISP	40-60%			
	SPAI	10-20%			
	LETR5	5-15%			
	JUBA	5-10%			
	CAREX	0-5%			
	POSE	0-5%			
	LECI	0-5%			
Other Perennial Graminoids		0-5%			
Shrubs	ATTO	0-3%	3%	41% (3)	8% (3)
	ERNA10	0-3%			
	ROWO	0-3%			
	SAEX	0-3%			
	SAVE4	0-3%			
Other Shrubs	SSSS	0-3%			
Trees	POFR2	2-5%			
	SALA3	2-5%			
Nonnative Species	NONA	0%	96%	59%	92%
Total Forbs		5-10%	0%	0%	0%
Total Perennial Graminoids		80%	0%	0%	0%
Total Shrubs		5-15%	4%	41%	8%
Total Trees		4-10%	0%	0%	0%
Total Nonnative Species		0%	96%	59%	92%
Similarity Index			3%	3%	3%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.					

Table 35. Frequency (%), THIBAUT_05

Life Forms	Species	2002	2003	2005	2004	2007	2009
Annual Forb	CHHI	0	0	0	1	0	0
	CHIN2	0	6	3	0	0	0
Perennial Forb	HECU3	0	0	0	2	2	24**
	MALE3	0	0	0	0	0	10**
Perennial Graminoid	DISP	0	0	0	0	4	3
Shrubs	ATTO	0	7	3	4	2	1
Nonnative Species	AMAL	0	0	0	2	0	0
	BAHY	0	19	9	42	0	2
	DESO2	0	0	16	6	0	0
	TARA	0	0	3	0	0	0
	SATR12	0	16	24	19	0	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 36. Cover (%) Forbs, Graminoids, Sub-shrubs THIBAUT_05

Life Forms	Species	2002	2003	2005	2004	2007	2009
Annual Forb	CHHI	0	0	0	T	0	0
	CHIN2	0	T	T	0	0	0
Perennial Forb	HECU3	0	0	0	T	1	12
	MALE3	0	T	0	0	0	2
Perennial Graminoid	DISP	T	0	0	0	T	1
Shrubs	ATTO	0	0	0	0	0	0
Nonnative Species	AMAL	0	0	0	T	0	0
	BAHY	0	3	T	1	0	T
	DESO2	0	0	T	T	0	0
	SATR12	0	8	0	1	T	0

Table 37. Cover (%) Shrubs THIBAUT_05

Species	2003	2004	2005	2007
ATTO	1	1	0	1
TARA	0	0	0	0
Total	1	1	1	1

Table 38. Ground Cover (%) THIBAUT_05

Substrate	2002	2003	2004	2005	2007	2009
Bare Soil	0	15	34	32	24	6
Dung	2	0	1	1	1	T
Litter	91	75	66	62	75	94
Rock	0	0	0	0	0	0
Standing Dead	0	0	0	1	0	0
TARA Slash	0	0	48	31	0	0

Table 39. Shrub Densities and Age Classes THIBAUT_05

	ATTO				TARA
Age Class	**2003**	**2004**	**2005**	**2007**	**2004**
Seedling	2	0	0	0	0
Juvenile	3	4	0	0	2
Mature	4	0	6	3	0
Decadent	1	0	0	0	0
Total	10	4	6	3	2

THIBAUT_06

THIBAUT_06 is in a riparian management area in the Thibaut Riparian Exclosure. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. The similarity index during baseline sampling ranged between 10-16%. The site is located within the historical dry reach of the river. Tamarisk slash piles were burned at this site in 2008. As with all other floodplain areas in the former dry reach, fivehorn smotherweed covered the site in 2008. No new growth of fivehorn smotherweed was noted in 2009, but the site remained covered by decadent stands of this weed. Frequency results in 2009 indicate that return flows may be initiating success and changes at the site; salt heliotrope and saltgrass significantly increased compared to previous years.

Table 40. THIBAUT_06 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2003**	**2004**	**2005**	**2007**
Annual Forbs	AAFF	Trace to 2%	41% (2)	3% (2)	54% (2)	
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%				
	HECU3	0-2%				
Other Perennial Forbs		0-2%				
Perennial Graminoids	DISP	40-60%				5%
	SPAI	10-20%	5%	8%	7%	8%
	LETR5	5-15%				
	JUBA	5-10%				
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	5% (3)	25% (3)	20% (3)	86% (3)
	ERNA10	0-3%				
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%				
Other Shrubs	SSSS	0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species	NONA	0%	49%	64%	19%	
Total Forbs		5-10%	41%	3%	54%	0%
Total Perennial Graminoids		80%	5%	8%	7%	14%
Total Shrubs		5-15%	6%	25%	20%	86%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	49%	64%	19%	0%
Similarity Index			10%	13%	12%	16%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 41. Frequency (%), THIBAUT_06

Life Forms	Species	2003	2004	2005	2007	2009
Annual Forb	2FORB	0	0	0	0	0
	ATRIP	0	0	1	0	0
	ATSES	0	3	9	0	0
	ATTR	5	1	3	0	0
	CHENO	2	0	0	0	0
	CHHI	0	0	4	0	0
	CHIN2	0	0	3	0	0
	GITR	0	0	5	0	0
	MEAL6	0	14	72	0	0
Perennial Forb	HECU3	1	0	0	0	51**
Perennial Graminoid	DISP	2	2	2	3	15**
	SPAI	2	3	3	5	4
Shrubs	ATTO	11	8	9	3	0
Nonnative Species	BAHY	0	2	1	0	10**
	DESO2	0	19	3	0	0
	SATR12	17	60	52	0	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 42. Cover (%) Forbs, Graminoids, Sub-shrubs THIBAUT_06

Life Forms	Species	2003	2004	2005	2007	2009
Annual Forb	2FORB	0	T	0	0	0
	ATRIP	0	0	T	0	0
	ATSES	0	T	T	0	0
	ATTR	3	T	T	0	0
	CHENO	T	0	0	0	0
	CHHI	0	0	T	0	0
	CHIN2	0	0	T	0	0
	GITR	0	0	T	0	0
	MEAL6	0	T	7	0	0
Perennial Forb	HECU3	T	0	0	0	11
Perennial Graminoid	DISP	T	T	T	1	4
	SPAI	1	1	1	2	2
Shrubs	ATTO	0	0	0	0	0
Nonnative Species	BAHY	0	T	T	0	7
	DESO2	0	T	T	0	0
	SATR12	7	3	2	0	0

Table 43. Cover (%) Shrubs THIBAUT_06

Species	2003	2004	2005	2007	2009
ATTO	1	1	2	11	2
Total	1	1	2	11	2

Table 44. Ground Cover (%) THIBAUT_06

Substrate	2003	2004	2005	2007	2009
Bare Soil	19	28	41	41	20
Dung	T	T	T	1	T
Litter	76	71	61	59	80
Rock	T	0	T	T	0
Standing Dead	0	15	3	1	0
TARA Slash	0	13	12	19	0

Table 45. Shrub Densities and Age Classes THIBAUT_06

	ATTO				
Age Class	**2003**	**2004**	**2005**	**2007**	**2009**
Juvenile	2	3	0	0	0
Mature	3	2	2	4	2
Total	5	5	2	4	2

THIBAUT_07

THIBAUT_07 is in a riparian management area in the Thibaut Riparian Exclosure. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. The site is located within the historical dry reach of the Lower Owens River. Similarity index was 5% during the baseline sampling period. Nevada saltbush frequency increased and alkali mallow decreased in 2009 compared to 2007, however 2009 values did not exceed baseline ranges. Nevada saltbush density has steadily increased during the past three sampling periods. As with all other floodplain areas in the former dry reach, fivehorn smotherweed covered the site in 2008. No new growth of fivehorn smotherweed was noted in 2009, but the site remained covered by decadent stands of this weed.

Table 46. THIBAUT_07 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2003**	**2004**	**2005**	**2007**
Annual Forbs	AAFF	Trace to 2%	57% (2)	12% (2)	64% (2)	
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%				
	HECU3	0-2%				
Other Perennial Forbs		0-2%	T			3% (2)
Perennial Graminoids	DISP	40-60%				
	SPAI	10-20%				
	LETR5	5-15%				
	JUBA	5-10%				
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	5% (3)	20% (3)	3%	97% (3)
	ERNA10	0-3%				
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%				
Other Shrubs	SSSS	0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species	NONA	0%	38%	68%	33%	
Total Forbs		5-10%	57%	12%	64%	3%
Total Perennial Graminoids		80%	0%	0%	0%	0%
Total Shrubs		5-15%	5%	20%	3%	97%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	38%	68%	33%	0%
Similarity Index			5%	5%	5%	5%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 47. Frequency (%), THIBAUT_07

Life Forms	Species	2003	2004	2005	2007	2009
Annual Forb	2FORB	0	1	0	0	0
	ATSES	2	24	81	0	0
	ATTR	26	15	49	0	0
	GITR	0	0	3	0	0
Perennial Forb	HECU3	1	0	1	0	0
	MALE3	7	2	0	9	2*
Perennial Graminoid	DISP	3	3	0	4	0
Shrubs	ATTO	7	16	20	8	18*
Nonnative Species	BAHY	12	34	37	0	0
	DESO2	0	15	34	0	0
	SATR12	16	47	45	0	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 48. Cover (%) Forbs, Graminoids, Sub-shrubs THIBAUT_07

Life Forms	Species	2003	2004	2005	2007	2009
Annual Forb	2FORB	0	T	0	0	0
	ATSES	T	T	13	0	0
	ATTR	8	T	2	0	0
	GITR	0	0	T	0	0
Perennial Forb	HECU3	T	0	T	0	0
	MALE3	T	T	0	T	T
Perennial Graminoid	DISP	T	T	0	T	0
Shrubs	ATTO	0	0	0	0	0
Nonnative Species	BAHY	3	1	2	0	0
	DESO2	0	T	6	0	0
	SATR12	4	3	2	0	0

Table 49. Cover (%) Shrubs THIBAUT_07

Species	2003	2004	2005	2007	2009
ATTO	1	1	1	5	15
Total	1	1	1	5	15

Table 50. Ground Cover (%) THIBAUT_07

Substrate	2003	2004	2005	2007	2009
Bare Soil	94	97	97	94	20
Dung	2	T	T	1	T
Litter	5	3	3	5	80
Rock	0	0	0	0	0
Standing Dead	0	T	0	0	0

Table 51. Shrub Densities and Age Classes THIBAUT_07

	ATTO				
Age Class	**2003**	**2004**	**2005**	**2007**	**2009**
Seedling	0	0	7	0	0
Juvenile	0	2	15	13	0
Mature	2	0	0	2	37
Total	2	2	22	15	37

THIBAUT_08

THIBAUT_08 is in an upland management area in the upland Thibaut Pasture. The soils are Division Numu Complex, 0-2% slopes, which corresponds to the Saline Bottom ecological site. The transect was first established and read in 2007. The similarity index was 64%. There were no changes in frequency data between 2007 and 2009. Utilization was well below the 65% standard for use at upland sites for 2008 and 2009.

Table 52. THIBAUT_08 Comparison to Saline Bottom Ecological Site

Ecological Site: Saline Bottom		% Comp by Weight	
Functional Group	**Species**	**Site Potential**	**2007**
Annual Forbs	AAFF	Trace to 2%	
Perennial Forbs	ASLE8	0-2%	
	CASTI	0-2%	
	STEPH	0-2%	
Other Perennial Forbs		0-2%	
Perennial Graminoids	SPAI	25-45%	30%
	DISP	10-20%	38% (20)
	LECI	5-10%	
	JUBA	0-2%	1%
	POSE	0-2%	
	ORHY	0-2%	
Other Perennial Graminoids		0-2%	3% (2)
Shrubs	SAVE4	5-15%	
	ATCO	5-10%	
	ATPA3	2-5%	
	MACA17	0-3%	
	ERNA10	0-3%	12% (3)
	TEGL	0-3%	
	ATTO	0-3%	4% (3)
	ARTRW8	0-3%	
	SUMO	0-3%	
Other Shrubs		0-5%	13% (5)
Nonnative Species		0%	
Total Forbs		10%	0%
Total Perennial Graminoids		65%	71%
Total Shrubs		25%	29%
Total Nonnative Species		0%	0%
Similarity Index			64%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.			

Table 53. Utilization by Species, THIBAUT_08

	DISP	SPAI	SPGR
2008	9%	24%	
2009	10%	10%	7%

Table 54. Utilization, Weighted Average, THIBAUT_08

2008	2009
17%	10%

Table 55. Frequency (%), THIBAUT_08

Life Forms	Species	2007	2009
Perennial Forb	PYRA	0	2
	STPA4	0	1
	STEX	1	0
Perennial Graminoid	DISP	108	122
	JUBA	12	15
	SPAI	42	41
	SPGR	14	11
Shrubs	ALOC2	16	16
	ATCO	5	0
	ATTO	20	11
	ERNA10	16	22
	SAVE4	4	2

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 56. Cover (%) Forbs, Graminoids, Sub-shrubs THIBAUT_08

Life Forms	Species	2007	2009
Perennial Forb	PYRA	0	T
	STPA4	T	T
	STEX	T	0
Perennial Graminoid	DISP	7	8
	JUBA	T	T
	SPAI	9	6
	SPGR	1	0
Shrubs	ALOC2	0	2
	ATCO	0	0
	ATTO	0	0
	ERNA10	0	0
	SAVE4	0	0

Table 57. Cover (%) Shrubs THIBAUT_08

Species	2007	2009
ALOC2	4	0
ATTO	1	1
ERNA10	3	3
Total	8	4

Table 58. Ground Cover (%) THIBAUT_08

Substrate	2007	2009
Bare Soil	61	79
Dung	3	2
Litter	36	19
Standing Dead	1	2

Table 59. Shrub Densities and Age Classes THIBAUT_08

	ATCO	ATTO		ERNA10	
Age Class	**2009**	**2007**	**2009**	**2007**	**2009**
Seedling	0	0	11	0	2
Juvenile	2	6	0	14	14
Mature	0	2	8	6	8
Decadent	2	3	0	2	7
Total	4	11	19	22	31

THIBAUT_09

THIBAUT_09 is an upland management area in the Thibaut Pasture. The soils are Division-Numu Complex with 0-2% slopes, which correspond to the Saline Bottom ecological site. The transect was first established and read in 2007. The similarity index was 26% in 2007. The low similarity index resulted from the lack of alkali sacaton when compared to the site description for Saline Bottoms. Overall annual aboveground production is low for the site, likely because of soil disturbance from scraping during the high water years in the late 1960s. Frequency did not differ between 2007 and 2009. Utilization was low for the site for 2008 and 2009.

Table 60. THIBAUT_09 Comparison to Saline Bottom Ecological Site

Ecological Site: Saline Bottom		**% Comparison by Weight**	
Functional Group	**Species**	**Site Potential**	**2007**
Annual Forbs	AAFF	Trace to 2%	
Perennial Forbs	ASLE8	0-2%	
	CASTI	0-2%	
	STEPH	0-2%	
Other Perennial Forbs		0-2%	2%
Perennial Graminoids	SPAI	25-45%	4%
	DISP	10-20%	94% (20)
	LECI	5-10%	
	JUBA	0-2%	
	POSE	0-2%	
	ORHY	0-2%	
Other Perennial Graminoids		0-2%	
Shrubs	SAVE4	5-15%	
	ATCO	5-10%	
	ATPA3	2-5%	
	MACA17	0-3%	
	ERNA10	0-3%	
	TEGL	0-3%	
	ATTO	0-3%	
	ARTRW8	0-3%	
	SUMO	0-3%	
Other Shrubs		0-5%	
Nonnative Species		0%	
Total Forbs		10%	2%
Total Perennial Graminoids		65%	98%
Total Shrubs		25%	0%
Total Nonnative Species		0%	0%
Similarity Index			26%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.			

Table 61. Utilization by Species, THIBAUT_09

	DISP
2008	9%
2009	13%

Table 62. Utilization, Weighted Average, THIBAUT_09

2008	2009
9%	13%

Table 63. Frequency (%), THIBAUT_09

Life Forms	Species	2007	2009
Perennial Forb	CRTR5	13	10
Perennial Graminoid	DISP	108	117
	SPAI	3	3
Shrubs	ATTO	2	2
	ERNA10	0	1

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 64. Cover (%) Forbs, Graminoids, Sub-shrubs THIBAUT_09

Life Forms	Species	2007	2009
Perennial Forb	CRTR5	T	T
Perennial Graminoid	DISP	8	7
	SPAI	1	T
Shrubs	ATTO	0	0
	ERNA10	0	0

Table 65. Cover (%) Shrubs THIBAUT_09

Species	2007	2009
ATTO	T	T
Total	0	0

Table 66. Ground Cover (%) THIBAUT_09

Substrate	2007	2009
Bare Soil	70	90
Dung	1	T
Litter	29	9
Rock	T	0

Table 67. Shrub Densities and Age Classes THIBAUT_09

	ATTO		SAVE4	
Age Class	**2007**	**2009**	**2007**	**2009**
Juvenile	3	4	0	0
Mature	1	1	1	2
Decadent	0	0	1	0
Total	4	5	2	2

Irrigated Pastures

The northern portion of the Thibaut Pasture (85 acres) comprises the area managed as irrigated pasture for the Thibaut Lease. With the completion of the new fencing for the LORP creating the Waterfowl management area located directly north, and rare plant management area. It is located directly west of the irrigated pasture where a grazing corridor has been created. This corridor has increased grazing pressure on the irrigated portion of the Thibaut Field. The subsequent increase in grazing pressure has negatively affected irrigated pasture condition. The negative effects are a minimum score of 80% due to weeds, uneven grazing, and some bare spots. Conditions are not bad at this time but management actions should change in order to increase future forage conditions in the area. This irrigated pasture will be re-evaluated in the 2009-10 grazing season.

Stock Water Sites

There is one identified water site needed in the Thibaut Field. This site is a flowing well located in the uplands east of irrigated pastures in the Thibaut Field. This well produces sporadically through out the year, creating a small puddle area for livestock and wildlife. It has been approved to be refitted as stock water well and will be completed in 2010.

Fencing

The fencing for the Thibaut Lease consists of one exclosure and two special management areas: Thibaut Riparian Exclosure, the Waterfowl Management Area, and the Rare Plant Management Area. These projects have been completed and no other fencing is planned for the lease.

Rare Plant Management Area Thibaut

This pasture contains both a *S. covillei* and a *C. excavatus* population. Trend plots Rare Plant Management Area 1 and Rare Plant Management Area 4 are within an exclosure that is restricted from grazing from early March through early October per the LORP EIR during the rare plants' flowering, fruiting, and seeding period. The pasture was grazed with end-of-season utilization at 55%. Phenology included individuals that were in bud to individuals that had already set seed. The overall phenology was late with most individuals setting seed.

Table 208. Rare Plant Management Area Pasture Thibaut Lease

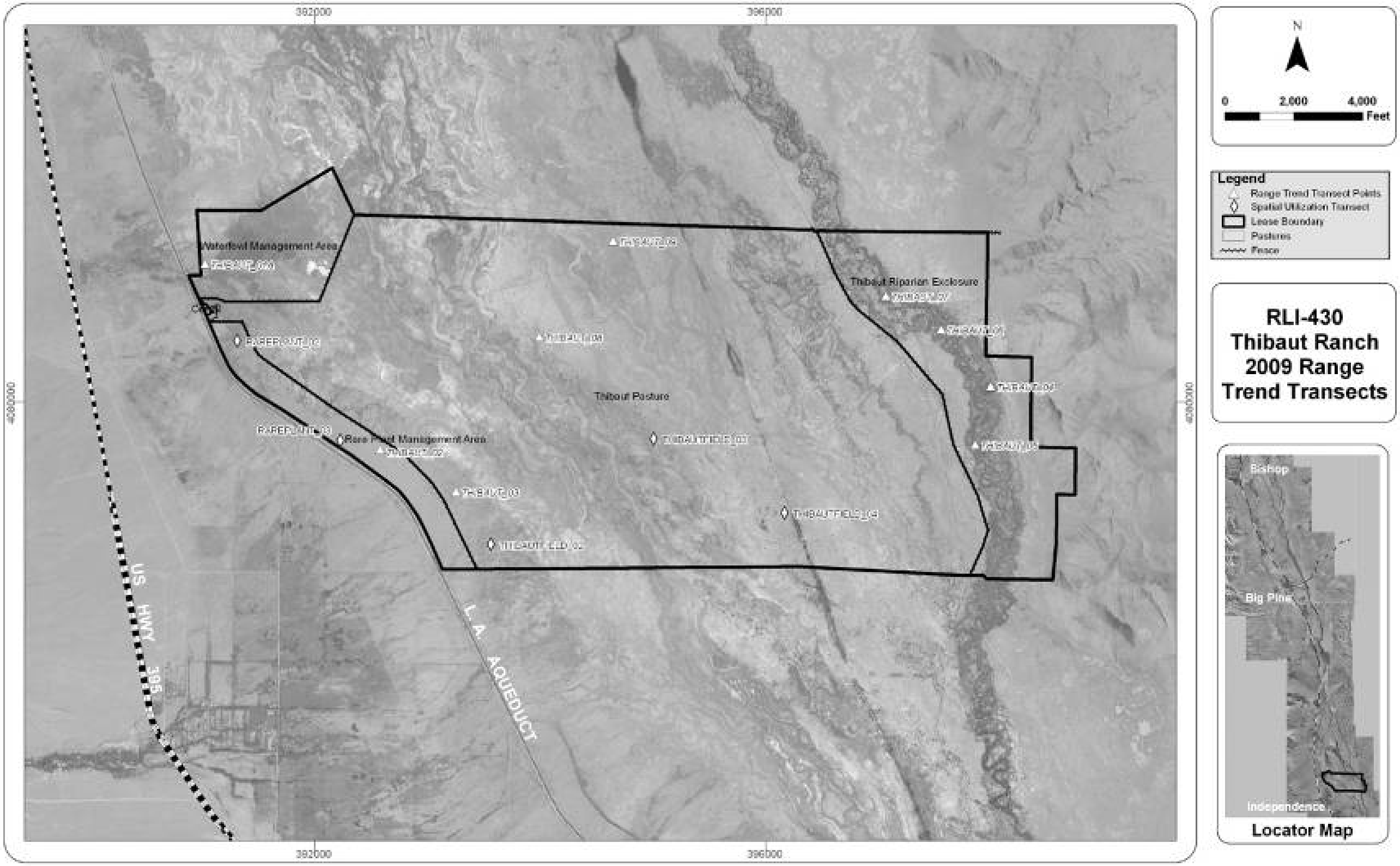
Plot Number	Species	Seedling	Juvenile	Mature	Total
Rare Plant Management Area 1	*C. excavatus*	0	0	3	3
Rare Plant Management Area 1	*S. covillei*	0	9	21	30
Rare Plant Management Area 4	*C. excavatus*	0	0	2	2
Rare Plant Management Area 4	*S. covillei*	0	7	32	39

Salt and Supplement Sites

There are no new salt or supplement sites located on the Thibaut Lease.

Burning

There were no wildfires or controlled range improvement burns on the lease during 2009. However, there was the continuation of the burning of tamarisk slash piles in the Thibaut Riparian Exclosure. There may be the possibility of burning the Waterfowl Management Area to maintain waterfowl open areas and continued tamarisk slash pile burning in the Thibaut Riparian Exclosure in 2010.



Land Use Figure 4. Thibaut Lease RLI-430, Range Trend Transect Locations

6.7.5. Islands Lease (RLI-489)

The Islands Lease is an 18,970-acre cow/calf operation divided into 11 pastures. In some portions of the lease, grazing occurs year round with livestock rotated between pastures based on forage conditions. Other portions of the lease are grazed October through May. The Islands Lease is managed in conjunction with the Delta Lease. Cattle from both leases are moved from one lease to the other as needed throughout the grazing season.

There are nine pastures located with in the LORP boundary of the Islands Lease:

- Reinhackle Field
- Bull Field
- Reinhackle Field
- Bull Pasture
- Carasco North Field
- Carasco South Field
- Carasco Riparian Field
- Depot Riparian Field
- River Field

Summary of Utilization

The following tables present the summarized utilization data for each pasture, for the transects in each pasture, and by species for each transect for the current year.

Table 1. End of Grazing Season Utilization for Pastures on the Islands Lease, RLI-489

Carasco Riparian Field *	13%
Depot Riparian Field*	29%
River Field *	27%

**Riparian pastures (40% utilization standard)*

Table 2. End of Grazing Season Utilization for Transects on the Islands Lease, RLI-489

Pasture	Transect	
Carasco Riparian Field*	ISLAND_06	13%
Depot Riparian Field*	ISLAND_08	15%
	ISLAND_09	50%
	RIVERFIELD_09	29%
	RIVERFIELD_08	40%
	RIVERFIELD_07	29%
River Field *	ISLAND_07	46%
	ISLAND_10	5%
	ISLAND_11	44%
	ISLAND_12	22%

**Riparian pastures (40% utilization standard)*

Table 3. Utilization Levels at Each Transect at the Species Level, Island Lease

		Grass Species			
Pasture	**Transect**	**DISP**	**LETR5**	**POSE**	**SPAI**
Carasco Riparian Field	ISLAND_06	9%			18%
River Field	ISLAND_07	46%			
	ISLAND_10	5%			
	ISLAND_11	44%			
	ISLAND_12	22%			
Depot Riparian Field	RIVERFIELD_09	24%	5%		42%
	ISLAND_09	50%			
	RIVERFIELD_07	29%			
	RIVERFIELD_08	37%	55%		
	ISLAND_08	15%			15%

Riparian Management Areas

While sampling at the end of April and beginning of May for end-of-season utilization on the Delta and on Islands, considerable spring growth had already begun. By early May, spring green-up on all the moist floodplain sites in the riparian pastures had already exceeded target stubble heights for the year prior in the riparian pastures. Because late spring growth had already surpassed stubble heights from the winter grazing period, future end-of-season utilization sampling will begin at the onset of spring growth of saltgrass and sacaton which will typically initiates in mid-March to mid-April, depending upon growing conditions.

2010 Grazing Season

The table below presents targeted stubble heights (inches) by species for the 2010 grazing season. These measurements are intended to be used throughout the grazing season to help gauge the utilization on the lease. The 2010 not-to-exceed stubble height is based on the ungrazed height of key forage species on the lease.

Table 4. Target Stubble Heights (in) for Key Species by Pasture, Islands Lease

	Grass Species			
Pasture	**DISP**	**LETR5**	**POSE**	**SPAI**
Carasco Riparian Field	4			4
Depot Riparian Field	4	8		6
River Field	4			8

Effects of the LORP project are ongoing as the area adapts to the increased water from the river. LADWP Watershed Resources staff and Ecosystems Sciences have met with the lessee in order to address the problem of flooding in the River Field-Islands area on the lease. A prescribed burn or burns in 2010 have been proposed for the lease on to help offset any loss of forage in the area. The lessee has agreed to this and preparations are being made.

Summary of Range Trend Data and Conditions

Monitoring site photos are presented in Appendix 3 – Section 5. The six range trend sites in the riparian areas on the Island Lease were relatively static with the exception of ISLAND_07 and ISLAND_08. At ISLAND_08 the cover and frequencies of shrub species has increased while the site has retained a grass understory. This transect is situated in an area that has been designated for a prescribed burn during winter 2009-10 to remove shrub cover. ISLAND_07 has been flooded since the return of flows to the Lower Owens River and as a result has altered the plant species composition on the transect such that one-third of the transect is now dominated by cattails.

The similarity index ranged between 50-73% for all Moist Floodplain sites. Island_06 was rated in excellent condition the entire baseline period and increased outside of the baseline levels with a significant increase in saltgrass frequency. Frequency results in 2009 were static compared to previous years data. In general, sites appear stable across the entire lease with the exception of increasing shrubs at ISLAND_08 and flooding on ISLAND_07.

ISLAND_06

ISLAND_06 is a riparian management area in the Carasco Riparian Field South. The soils are Manzanar Silt Loam, 0-2% slopes, which corresponds to the Saline Meadow ecological site. The similarity index for this site has been high, ranging between 82-91%. Saltgrass frequency significantly increased in 2009 beyond the range of variability observed during the baseline period. Nevada saltbush and rubber rabbitbush have remained static. The trend with perennial grasses (saltgrass) is increasing for the site, although the site initially and continually remains in high ecological condition. Utilization during the past three years has been well below the 40% threshold for riparian management areas.

Table 13. ISLAND_06 Comparison to Saline Meadow Ecological Site

Ecological Site: Saline Meadow		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%				
Perennial Forbs	ANCA10	0-2%				
	CALI4	0-2%				
	PYRA	0-2%				
Other Perennial Forbs		0-2%		1%		
Perennial Graminoids	DISP	25-50%	26%	27%	45%	40%
	SPAI	25-50%	58% (50)	53% (50)	37%	35%
	JUBA	5-15%	1%	T	T	
	LETR5	5-10%				
	CAREX	0-2%				
	POSE	0-2%				
	LECI	0-2%				
Other Perennial Graminoids		0-2%				
Shrubs	ATTO	0-5%	11% (5)	16% (5)	14% (5)	23% (5)
	ERNA10	0-5%	4%	2%	4%	2%
	ROWO	0-5%				
	SALIX	0-5%				
	SAVE4	0-5%				
Other Shrubs		0-5%				
Trees	SAGO	0-10%				
	POFR2	0-5%				
Nonnative Species		0%				
Total Forbs		5%	0%	1%	0%	0%
Total Perennial Graminoids		80%	85%	81%	82%	74%
Total Shrubs		5-15%	15%	18%	18%	26%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	0%	0%
Similarity Index			86%	85%	91%	82%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 14. Utilization, Weighted Average, ISLAND_06

2007	**2008**	**2009**
29%	18%	13%

Table 15. Utilization by Species, ISLAND_06

	DISP	SPAI
2007	12%	45%
2008	9%	26%
2009	9%	18%

Table 16. Frequency (%), ISLAND_06

Life Forms	Species	2002	2003	2004	2007	2008	2009
Perennial Forb	GLLE3	0	4	0	1	0	0
	NIOC2	0	0	0	0	2	8
Perennial Graminoid	DISP	90	62	92	103	117	132*
	JUBA	5	5	5	3	5	7
	LETR5	0	0	0	1	2	0
	SPAI	105	103	105	98	104	117
Shrubs	ATTO	19	9	19	7	11	7
	ERNA10	9	0	3	1	3	7

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 17. Cover (%) Forbs, Graminoids, Sub-shrubs ISLAND_06

Life Forms	Species	2002	2003	2004	2007	2008	2009
Perennial Forb	GLLE3	0	1	0	T	0	0
	NIOC2	0	0	0	0	T	T
Perennial Graminoid	DISP	12	14	15	17	17	30
	JUBA	1	T	T	T	T	T
	LETR5	0	0	0	T	T	0
	SPAI	39	40	31	22	18	42
Shrubs	ATTO	5	0	0	0	0	0
	ERNA10	3	0	0	0	0	0

Table 18. Cover (m) Shrubs ISLAND_06

Species	2003	2004	2007	2008	2009
ATTO	7.6	7.3	9.5	7.9	8.9
ERNA10	1.3	2.9	1.4	2.1	2.1
Total	8.8	10.3	10.9	10.0	11.0

Table 19. Ground Cover (%)ISLAND_06

Substrate	2002	2003	2004	2007	2008	2009
Bare Soil	14	15	17	16	9	13
Dung	2	1	2	1	1	0
Litter	76	65	47	84	90	87
Rock	0	0	0	0	0	0
Standing Dead	0	0	1	2	4	7

Table 20. Shrub Densities and Age Classes ISLAND_06

	ATTO						ERNA10					
Age Class	**2002**	**2003**	**2004**	**2007**	**2008**	**2009**	**2002**	**2003**	**2004**	**2007**	**2008**	**2009**
Seedling	0	0	1	0	0	0	0	0	0	0	0	0
Juvenile	11	15	2	17	1	0	4	7	4	6	2	0
Mature	27	52	39	34	46	36	6	7	14	8	11	14
Decadent	6	6	6	3	5	4	4	9	2	6	4	6
Total	44	73	48	54	52	40	14	23	20	20	17	20

ISLAND_07

ISLAND_07 is a riparian management area located in the River Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. Similarity index during the baseline period has ranged between 63-65%. The site is dominated by saltgrass and has been partially submerged following the return of flows to the Lower Owens River. There were no significant changes in frequency on 2009 compared to 2007. There has been a noticeable decrease in Nevada saltbush cover and density caused by both the rising water table and surface ponding. The appearance of chairmaker's bulrush (*Schoenoplectus americanus* [SCAM6]) and broadleaf cattail (*Typha latifolia* [TYLA]) are also evidence of the site becoming increasingly hydric. Utililization in 2007 exceeded the 40% limit (63%), in 2008 the site was flooded, and in 2009 use was at 46%. An adjacent spatial utilization transect, ISLAND_12 was at 22% in 2009, contributing to an overall average of 27% for the River Field.

Table 21. ISLAND_07 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%	2%		T	8% (2)
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%				
	HECU3	0-2%				
Other Perennial Forbs		0-2%				T
Perennial Graminoids	DISP	40-60%	93% (60)	85% (60)	94% (60)	91% (60)
	SPAI	10-20%				
	LETR5	5-15%			4%	T
	JUBA	5-10%				
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	3%	12% (3)	2%	1%
	ERNA10	0-3%				
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%				
Other Shrubs	SSSS	0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species	NONA	0%	2%	2%		
Total Forbs		5-10%	2%	0%	0%	8%
Total Perennial Graminoids		80%	93%	85%	98%	91%
Total Shrubs		5-15%	3%	12%	2%	1%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	2%	2%	0%	0%
Similarity Index			65%	63%	66%	63%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 22. Utilization, Weighted Average, ISLAND_07

2007	2009
63%	46%

Table 23. Utilization by Species, ISLAND_07

	DISP	SPAI
2007	63%	63%
2009	46%	

Table 24. Frequency (%), ISLAND_07

Life Forms	Species	2002	2003	2004	2007	2008	2009
Annual Forb	COMAC	3	3	0	5	0	0
	HEAN3	0	0	5	0	0	0
Perennial Forb	FRSA	0	0	0	3	0	0
	HECU3	0	2	0	0	0	0
Perennial Graminoid	DISP	133	140	154	155	118	120
	ELEOC	0	0	0	0	1	3
	JUBA	0	0	0	0	6	3
	LETR5	0	0	5	3	0	0
	SCAM6	0	0	0	0	19	10
	TYLA	0	0	0	2	18	19
Shrubs	ATTO	0	0	0	0	0	0
Nonnative Species	POMO5	9	5	0	3	7	3

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 25. Cover (%) Forbs, Graminoids, Sub-shrubs ISLAND_07

Life Forms	Species	2002	2003	2004	2007	2008	2009
Annual Forb	COMAC	1	T	0	5	T	0
	HEAN3	0	0	T	0	0	0
Perennial Forb	FRSA	0	0	0	T	0	0
	HECU3	0	T	0	0	0	0
Perennial Graminoid	DISP	59	51	43	67	36	43
	ELEOC	0	0	0	0	T	T
	JUBA	0	0	0	0	1	T
	LETR5	0	0	2	T	0	0
	SCAM6	0	0	0	0	3	1
	TYLA	0	0	0	0	10	3
Shrubs	ATTO	2	0	0	0	0	0
Nonnative Species	POMO5	2	T	0	T	T	1

Table 26. Cover (m) Shrubs ISLAND_07

Species	2003	2004	2007	2008	2009
ATTO	7.0	0.8	0.7	0.2	0.3
TARA	0.3	0.0	0.0	0.0	0.0
Total	7.3	0.8	0.7	0.2	0.3

Table 27. Ground Cover (%)ISLAND_07

Substrate	2002	2003	2004	2007	2008	2009
Bare Soil	11	0	0	0	0	0
Dung	11	4	5	2	0	1
Litter	72	63	31	46	55	82
Rock	0	0	0	0	0	0
Standing Dead	0	0	7	0	0	4
Bare Ground	0	20	16	5	29	2
Water	0	0	0	46	17	15

Table 28. Shrub Densities and Age Classes ISLAND_07

	ATTO				ERNA10
Age Class	**2002**	**2003**	**2004**	**2008**	**2003**
Seedling	0	3	0	0	0
Juvenile	5	3	0	0	0
Mature	3	13	0	1	1
Decadent	0	3	3	0	0
Total	8	22	3	1	1

ISLAND_08

ISLAND_08 is located in the Depot Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. The similarity index for the site has ranged between 50%-70% during the baseline period. Nevada saltbush frequency significantly increased in 2009 as did density of Nevada saltbush seedlings. Increasing seedlings combined with a relatively high amount of shrub canopy cover (36m), and still intact fuel source (20% saltgrass cover) makes this area a strong candidate for a prescribed burn before shrubs completely displace the herbaceous understory. Utilization on the transect during the last two years has been well below the riparian standard of 40%.

Table 29. ISLAND_08 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%				
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%				
	HECU3	0-2%	T			
Other Perennial Forbs		0-2%	5% (2)			3% (2)
Perennial Graminoids	DISP	40-60%	56%	36%	52%	34%
	SPAI	10-20%	7%	6%	5%	5%
	LETR5	5-15%	T	2%	2%	1%
	JUBA	5-10%	2%	4%	2%	2%
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	4% (3)	12% (3)	13% (3)	12% (3)
	ERNA10	0-3%	25% (3)	40% (3)	26% (3)	42% (3)
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%				
Other Shrubs	SSSS	0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species	NONA	0%				
Total Forbs		5-10%	5%	0%	0%	3%
Total Perennial Graminoids		80%	66%	48%	61%	43%
Total Shrubs		5-15%	29%	52%	39%	54%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	0%	0%
Similarity Index			73%	54%	67%	50%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 30. Utilization, Weighted Average, ISLAND_08

2007	2008	2009
72%	18%	15%

Table 31. Utilization by Species, ISLAND_08

	DISP	SPAI
2007	66%	79%
2008	14%	23%
2009	15%	15%

Table 32. Frequency (%), ISLAND_08

Life Forms	Species	2002	2003	2004	2007	2008	2009
Annual Forb	**2FORB**	**0**	**0**	**6**	**0**	**0**	**0**
	ATPH	0	0	0	0	0	0
	ATTR	0	0	0	0	19	0*
	COMAC	0	0	0	0	0	0
	LACO13	0	0	0	0	5	0
Perennial Forb	GLLE3	7	0	7	8	5	0
	HECU3	3	0	0	0	3	4
	MALE3	0	0	0	1	0	4
Perennial Graminoid	DISP	112	77	106	90	94	86*
	JUBA	32	35	37	27	34	38
	LETR5	9	18	21	8	14	19
	SPAI	29	13	15	19	7	13
Shrubs	ATTO	19	4	7	10	28	47*
	ERNA10	20	15	34	24	21	25
Nonnative Species	LASE	0	0	0	0	0	0
	POMO5	0	0	0	0	2	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 33. Cover (%) Forbs, Graminoids, Sub-shrubs ISLAND_08

Life Forms	Species	2002	2003	2004	2007	2008	2009
Annual Forb	2FORB	0	0	T	0	0	0
	ATPH	0	0	0	0	1	0
	ATTR	0	0	0	0	1	0
	COMAC	0	0	0	0	T	0
	LACO13	0	0	0	0	T	0
Perennial Forb	GLLE3	4	0	T	2	1	T
	HECU3	T	0	0	0	T	T
	MALE3	0	0	0	T	0	T
Perennial Graminoid	DISP	33	26	25	17	14	20
	JUBA	1	3	1	1	1	1
	LETR5	T	2	1	1	3	3
	SPAI	6	7	4	4	1	3
Shrubs	ATTO	2	0	0	0	0	0
	ERNA10	19	0	0	0	0	0
Nonnative Species	LASE	0	0	0	0	T	0
	POMO5	0	0	0	0	T	0

Table 34. Cover (m) Shrubs ISLAND_08

Species	2003	2004	2007	2008	2009
ATTO	8.5	5.8	5.7	8.8	6.0
ERNA10	37.5	16.0	25.9	18.1	29.8
Total	46.0	21.9	31.6	26.9	35.8

Table 35. Ground Cover (%)ISLAND_08

Substrate	2002	2003	2004	2007	2008	2009
Bare Soil	5	0	0	0	0	0
Dung	0	1	3	2	1	0
Litter	91	85	52	89	71	89
Rock	0	0	0	0	0	0
Standing Dead	0	0	9	21	31	18
Bare Ground	0	4	12	8	28	8

Table 36. Shrub Densities and Age Classes ISLAND_08

	ATTO						**ERNA10**					
Age Class	**2002**	**2003**	**2004**	**2007**	**2008**	**2009**	**2002**	**2003**	**2004**	**2007**	**2008**	**2009**
Seedling	5	18	46	0	123	54	6	2	0	0	4	5
Juvenile	7	22	39	9	66	585	39	59	30	4	4	35
Mature	12	23	25	27	22	127	39	89	64	61	23	88
Decadent	0	2	3	9	6	9	17	17	39	69	32	17
Total	24	65	113	45	217	775	101	167	133	134	63	145

ISLAND_09

ISLAND_09 is located in the Depot Riparian Field pasture. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. Similarity index was between 63-64% during the baseline period. Species composition on the site is almost exclusively saltgrass and Nevada saltbush. Frequency has remained static over the four sampling periods. Utilization, initially was very high in 2007 and has since fluctuated between 34%in 2008 and 50% in 2009.

Table 37. ISLAND_09 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**		
Functional Group	**Species**	**Site Potential**	**2006**	**2007**
Annual Forbs	AAFF	Trace to 2%		
Perennial Forbs	PYRA	0-2%		
	NIOC2	0-2%		
	SUMO	0-2%	T	1%
	HECU3	0-2%		
Other Perennial Forbs		0-2%		
Perennial Graminoids	DISP	40-60%	80% (60)	80% (60)
	SPAI	10-20%		
	LETR5	5-15%		
	JUBA	5-10%		
	CAREX	0-5%		
	POSE	0-5%		
	LECI	0-5%		
Other Perennial Graminoids		0-5%		
Shrubs	ATTO	0-3%	20% (3)	19% (3)
	ERNA10	0-3%		
	ROWO	0-3%		
	SAEX	0-3%		
	SAVE4	0-3%		
Other Shrubs	SSSS	0-3%		
Trees	POFR2	2-5%		
	SALA3	2-5%		
Nonnative Species	NONA	0%		
Total Forbs		5-10%	0.1%	1.1%
Total Perennial Graminoids		80%	80.2%	79.7%
Total Shrubs		5-15%	19.7%	19.2%
Total Trees		4-10%	0.0%	0.0%
Total Nonnative Species		0%	0.0%	0.0%
Similarity Index			63%	64%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.				

Table 38. Utilization, Weighted Average, ISLAND_09

2007	**2008**	**2009**
92%	34%	50%

Table 39. Utilization by Species, ISLAND_09

	DISP
2007	92%
2008	34%
2009	50%

Table 40. Frequency (%), ISLAND_09

Life Forms	Species	2006	2007	2008	2009
Perennial Forb	SUMO	9	1	4	1
Perennial Graminoid	DISP	144	140	152	140
Shrubs	ATTO	7	9	6	11
Nonnative Species	BAHY	2	0	3	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 41. Cover (%) Forbs, Graminoids, Sub-shrubs ISLAND_09

Life Forms	Species	2006	2007	2008	2009
Perennial Forb	SUMO	0	0	0	0
Perennial Graminoid	DISP	37	31	44	30
Nonnative Species	BAHY	T	0	T	0

Table 42. Cover (m) Shrubs ISLAND_09

Species	2006	2007	2008	2009
ATTO	8.6	7.0	6.6	9.8
SUMO	0.0	0.5	0.0	1.8
Total	8.7	7.5	6.6	11.7

Table 43. Ground Cover (%)ISLAND_09

Substrate	2006	2007	2008	2009
Dung	8	5	6	4
Litter	63	67	68	80
Rock	0	0	0	0
Standing Dead	0	0	1	3
Bare Ground	28	28	24	16

Table 44. Shrub Densities and Age Classes ISLAND_09

	ATTO				SUMO			
Age Class	**2006**	**2007**	**2008**	**2009**	**2006**	**2007**	**2008**	**2009**
Seedling	11	0	1	0	6	0	0	5
Juvenile	25	4	1	0	39	22	1	6
Mature	28	29	23	22	14	24	22	32
Decadent	1	0	0	5	2	3	0	0
Total	65	33	25	27	61	49	23	43

ISLAND_10

ISLAND_10 is located in the Riparian River Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. The similarity index during baseline period was 65%. The site is dominated by saltgrass and Nevada saltbush. A significant increase in alkali seaheath (*Frankenia salina* [FRSA]) was the only change in frequency observed in 2009. Shrub cover and density were confined to within baseline ranges. Utilization on the site has been minimal during the last two years. In February 2009, a grazing exclosure was built just north of ISLAND_10. A range trend plot will be installed and read during the next sampling period.

Table 45. ISLAND_10 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**		
Functional Group	**Species**	**Site Potential**	**2006**	**2007**
Annual Forbs	AAFF	Trace to 2%		
Perennial Forbs	PYRA	0-2%		
	NIOC2	0-2%		
	SUMO	0-2%		T
	HECU3	0-2%		
Other Perennial Forbs		0-2%	10% (2)	10% (2)
Perennial Graminoids	DISP	40-60%	70% (60)	70% (60)
	SPAI	10-20%	T	T
	LETR5	5-15%		
	JUBA	5-10%		
	CAREX	0-5%		
	POSE	0-5%		
	LECI	0-5%		
Other Perennial Graminoids		0-5%		
Shrubs	ATTO	0-3%	20% (3)	20% (3)
	ERNA10	0-3%		
	ROWO	0-3%		
	SAEX	0-3%		
	SAVE4	0-3%		
Other Shrubs	SSSS	0-3%		
Trees	POFR2	2-5%		
	SALA3	2-5%		
Nonnative Species	NONA	0%		
Total Forbs		5-10%	7%	6%
Total Perennial Graminoids		80%	75%	76%
Total Shrubs		5-15%	18%	19%
Total Trees		4-10%	0%	0%
Total Nonnative Species		0%	0%	0%
Similarity Index			65%	65%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.				

Table 46. Utilization, Weighted Average, ISLAND_10

2007	**2008**	**2009**
63%	19%	5%

Table 47. Utilization by Species, ISLAND_10

	DISP
2007	63%
2008	19%
2009	5%

Table 48. Frequency (%), ISLAND_10

Life Forms	Species	2006	2007	2008	2009
Perennial Forb	CRTR5	23	18	31	30
	FRSA	22	11	5	17*
Perennial Graminoid	DISP	132	124	144	149
	SPAI	4	2	2	2
Shrubs	ATTO	6	3	7	1

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 49. Cover (%) Forbs, Graminoids, Sub-shrubs ISLAND_10

Life Forms	Species	2006	2007	2008	2009
Perennial Forb	CRTR5	1	1	2	1
	FRSA	3	2	1	1
Perennial Graminoid	DISP	29	32	31	30
	SPAI	2	1	1	1
Shrubs	ATTO	0	0	0	0

Table 50. Cover (m) Shrubs ISLAND_10

Species	2006	2007	2008	2009
ATTO	7.1	7.5	10.8	10.1
SUMO	0.0	0.2	0.0	0.1
Total	7.1	7.7	10.8	10.2

Table 51. Ground Cover (%)ISLAND_10

Substrate	2006	2007	2008	2009
Dung	6	5	2	1
Litter	75	74	84	85
Rock	0	1	0	0
Standing Dead	18	12	2	3
Bare Ground	19	21	13	14

Table 52. Shrub Densities and Age Classes ISLAND_10

	ATTO				SUMO			
Age Class	**2006**	**2007**	**2008**	**2009**	**2006**	**2007**	**2008**	**2009**
Seedling	1	0	0	0	0	0	0	0
Juvenile	12	1	3	0	0	0	0	0
Mature	20	18	22	23	1	1	1	1
Decadent	3	4	2	8	0	0	0	0
Total	36	23	27	31	1	1	1	1

ISLAND_11

ISLAND_11 is located in the River Field Riparian pasture. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. Similarity index was 64% during the baseline period. Frequency in 2009 compared to 2007 was unchanged. No shrubs were present on the site. Utilization has remained below riparian pasture standards for the last three years.

Table 53. ISLAND_11 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**		
Functional Group	**Species**	**Site Potential**	**2006**	**2007**
Annual Forbs	AAFF	Trace to 2%		
Perennial Forbs	PYRA	0-2%		
	NIOC2	0-2%	16% (2)	8% (2)
	SUMO	0-2%		
	HECU3	0-2%		
Other Perennial Forbs		0-2%	12% (2)	14% (2)
Perennial Graminoids	DISP	40-60%	72% (60)	78% (60)
	SPAI	10-20%		
	LETR5	5-15%		
	JUBA	5-10%		
	CAREX	0-5%		
	POSE	0-5%		
	LECI	0-5%		
Other Perennial Graminoids		0-5%		
Shrubs	ATTO	0-3%		
	ERNA10	0-3%		
	ROWO	0-3%		
	SAEX	0-3%		
	SAVE4	0-3%		
Other Shrubs	SSSS	0-3%		
Trees	POFR2	2-5%		
	SALA3	2-5%		
Nonnative Species	NONA	0%		
Total Forbs		5-10%	28%	22%
Total Perennial Graminoids		80%	72%	78%
Total Shrubs		5-15%	0%	0%
Total Trees		4-10%	0%	0%
Total Nonnative Species		0%	0%	0%
Similarity Index			64%	64%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.				

Table 54. Utilization, Weighted Average, ISLAND_11

2007	**2008**	**2009**
9%	12%	44%

Table 55. Utilization by Species, ISLAND_11

	DISP
2007	9%
2008	12%
2009	44%

Table 56. Frequency (%), ISLAND_11

Life Forms	Species	2006	2007	2008	2009
Annual Forb	ATPH	0	0	7	4
	COMAC	0	0	9	5
Perennial Forb	ANCA10	22	23	23	18
	NIOC2	72	47	62	59
Perennial Graminoid	DISP	148	154	157	157
	JUBA	0	0	0	4
Nonnative Species	SATR12	0	0	0	3

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 57. Cover (%) Forbs, Graminoids, Sub-shrubs ISLAND_11

Life Forms	Species	2006	2007	2008	2009
Annual Forb	ATPH	0	0	1	0
	COMAC	0	0	1	T
Perennial Forb	ANCA10	4	4	4	2
	NIOC2	8	4	7	6
Perennial Graminoid	DISP	31	32	33	28
	JUBA	0	0	0	T
Nonnative Species	SATR12	0	0	0	T

Table 58. Ground Cover (%) ISLAND_11

Substrate	2006	2007	2008	2009
Dung	1	1	0	0
Litter	30	38	42	37
Rock	0	0	0	0
Standing Dead	0	0	0	0
Bare Ground	69	62	58	63

Irrigated Pastures

The Bull Pasture located near Reinhackle Spring was rated in 2007 and received an irrigated pasture condition score of 90%. These pastures will not be rated again until 2010.

Table 59. Irrigated Pasture Condition Scores 2007-09

Pasture	2007	2008	2009
Bull Pasture	90	X	X

X indicates no evaluation made.

Stock Water Sites

There are two stock water sites located in the River Field--Islands east of the river near the old highway in the uplands. These sites range from 1-1.5 miles from the river. Currently these wells are out to bid with all the other purposed stock water wells for the LORP leases. The bid should be filled and work completed in 2010.

Fencing

The Islands Lease had proposed riparian fences in the Carasco Riparian and Depot Riparian Fields. These fences will connect an existing drift fence to improve the Depot Riparian Field. Prior to construction the lessee indicated that these proposed fences would not improve cattle management in this area and asked that they not be built. Watershed Resources staff explained that without these fences the lessee would have to adhere to riparian utilization standards for the entire pasture. The lessee understood and agreed to abide by this standard. However, if future monitoring shows forage utilization over 40%, both fences will be constructed.

There was one riparian exclosure built in 2009. The initial site for this exclosure had a range trend/utilization transect (Islands_10). However, this site did not have the channel morphology that was recommended by Ecosystem Sciences so the exclosure was moved and constructed 600 yards to the north. A range trend transect will be placed in this exclosure in 2010.

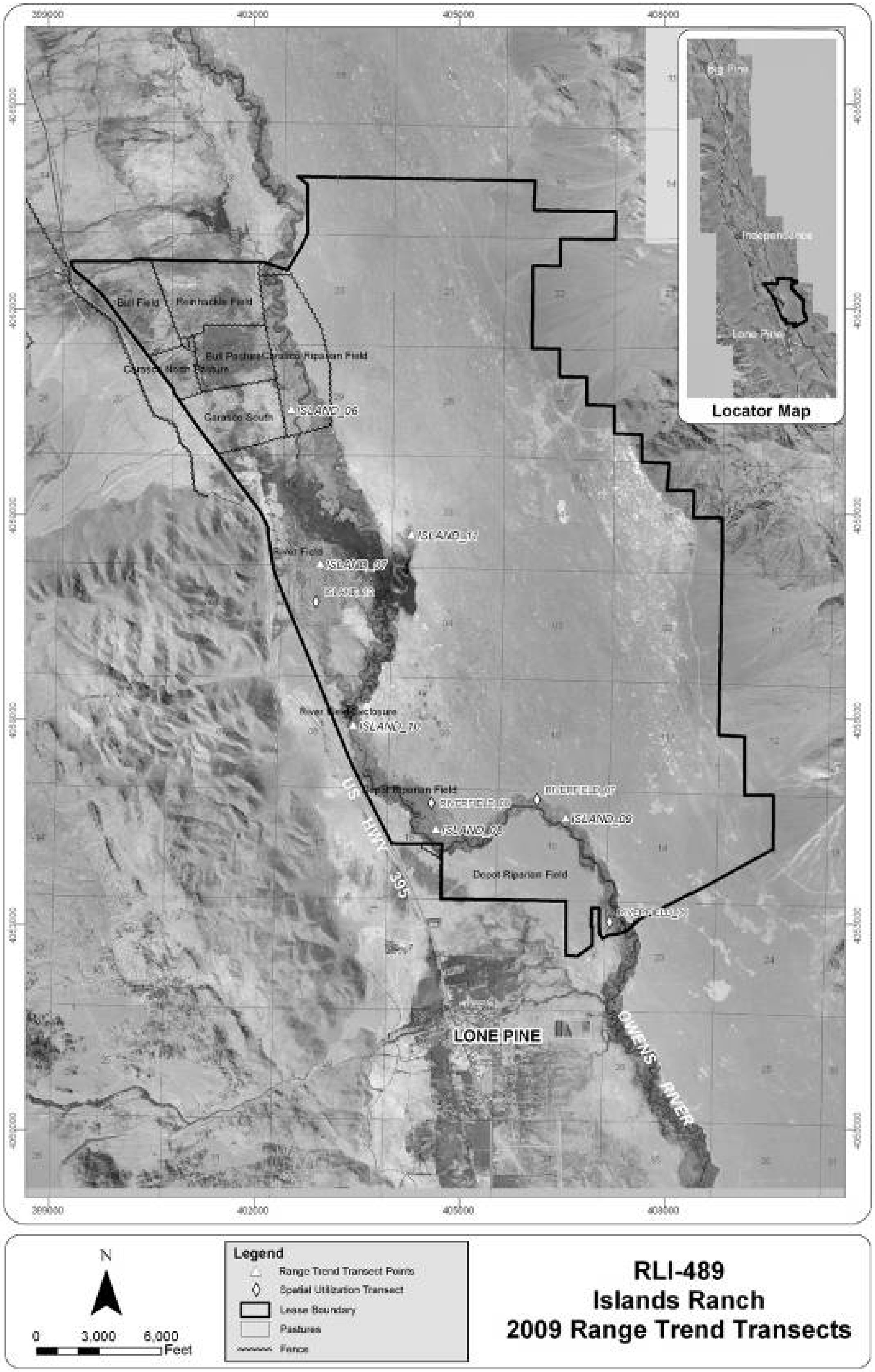
Salt and Supplement Site:

Cake blocks that contain trace minerals and protein are distributed for supplement on the lease. The blocks are dispersed randomly each time and if uneaten they biodegrade within one grazing season.

There were two supplement sites located adjacent to the Owens River, near Georges Creek during the RAS. These sites were not in the riparian area, but were on steep erodible terraces adjacent to the floodplain, and within the riparian fencing boundaries. These sites were further evaluated in 2009 and since they are established sites and have been used for countless years it did not look feasible to move them and disturb a new area.

Burning

There is one controlled burn proposed for the Depot Riparian Field north of Lone Pine Pond. The approximate size of the burn will be 500 acres and it should take place in late February or early March.



Land Use Figure 5. Islands Lease RLI-489, Range Trend Locations

6.7.6. Lone Pine Lease (RLI-456)

The Lone Pine Lease is an 8,274-acre cow/calf operation divided into 11 pastures and adjacent private ranch land. Grazing on the lease occurs from January 1 to March 30 and then again in late May to early June. In early June the cattle are moved south to Olancha and then driven to Forest Service Permits in Monache.

There are 11 pastures on the Lone Pine Lease located within the LORP project boundary:

East Side Pasture
Edwards Pasture
Richards Pasture
Richards Field
Johnson Pasture
Smith Pasture
Airport Field
Miller Pasture
Van Norman Pasture
Dump Pasture
River Pasture

<u>Summary of Utilization</u>

The following tables present the summarized utilization data for each pasture, for the transects in each pasture, and by species for each transect for the current year.

Table 1. End of Grazing Season Utilization for Pastures on the Lone Pine Lease, RLI-456, 2009.

	2005	**2007**	**2008**	**2009**
Johnson Pasture	28%	44%	2%	34%
River Pasture - Lone Pine	29%	76%	45%	53%

Table 2. End of Grazing Season Utilization for Transects on the Lone Pine Lease, RLI-456, 2009.

Johnson Pasture	LONEPINE_05	34%
River Pasture - Lone Pine	LONEPINE_01	61%
	LONEPINE_02	48%
	LONEPINE_03	70%
	LONEPINE_04	43%
	LONEPINE_07	51%

Table 3. Utilization at Each Transect at the Species Level, Lone Pine Lease, End of Grazing Season, 2009.

Pasture	**Transect**	**DISP**	**LETR5**	**SPAI**
River Pasture - Lone Pine	LONEPINE_01	61%		
	LONEPINE_02	38%		64%
	LONEPINE_03	72%	23%	66%
	LONEPINE_04	37%		51%
	LONEPINE_07	51%		
Johnson Pasture	LONEPINE_05			34%

Riparian

Riparian Management Area

For the second consecutive year the end-of-season use on the River Pasture – Lone Pine Riparian Pasture exceeded targeted levels, this year by 17%. All transects in the River Pasture Riparian Pasture surpassed the 40% allowable use. Mid-season estimates for the River Pasture Pasture, at the end of February, was at 20% use and 0% use on the upland Johnson Pasture.

Future end-of-season grazing sampling will occur prior to spring green up, typically between March and April. It should also be pointed out that the LORP Seasonal Habitat Flows on the Lone Pine Lease were surveyed in early June. There was no evidence of spring browsing of obligate riparian tree species along the river banks.

Maximum allowable use for upland pastures is 65%; however, the Johnson Pasture received only 34% use, all of which occurred after mid-season use which was 0% for the Johnson pasture. Although this pasture may not have been used to its fullest potential, it is encouraging to see that there remains some flexibility within the current grazing system to reduce grazing pressure on the riparian pasture. If the utilization standard is not met following the grazing period of 2010 we may reduce the 2011 utilization for the River Pasture to 35%.

2010 Grazing Season

The table below presents targeted stubble heights (in inches) by species for the 2010 grazing season. These measurements are intended to be used throughout the grazing season to help gauge the utilization on the lease. The 2010 not-to-exceed stubble height is based on the ungrazed height of key forage species on the lease.

Table 3. Target Stubble Heights (in) for Key Species by Pasture, Lone Pine

Pasture	DISP	LETR5	SPAI
River Pasture - Lone Pine	4	11	8
Johnson Pasture			6

Summary of Range Trend Data and Conditions

Baseline range trend monitoring was conducted at most sites three to four times from 2002-2007. Monitoring site photos are presented in Appendix 3 – Section 6. A new range trend site (LONEPINE_07) was established in 2007 and thus only two years of baseline data are available. The six riparian management area monitoring sites in the River Pasture were in high similarity compared to the desired plant community (site potential) during the baseline monitoring period. Similarity indices for the riparian management area monitoring sites, averaged for all years by transect ranged between 68-80%. These moist floodplain sites had a high diversity of perennial grasses on most sites and a minimal amount of shrubs. The similarity index at the one monitoring site in an upland management area ranged from 69-77%, indicating the site is in a late seral state as compared to the site potential. Plant frequency data for 2009, when compared to previous years, indicates either a static or upward trend. Creeping wildrye frequency increased outside the historic range of variability on LONEPINE_01 and LONEPINE_02. Trend for all sites in 2009 was either static or upward. In general, despite high utilization rates, the riparian pasture was initially and continues to remain in high ecological condition. LONEPINE_06 now lies within a livestock exclosure. As a result currently there is only one range trend transect on the east side of the River Pasture that is being grazed by livestock. To compensate for this loss, an additional range trend transect will be established on the east side of the river prior to the next monitoring period.

LONEPINE_01

This site is in a riparian management area on the west side of the Owens River, just north of Lone Pine Creek in the River Pasture. The soil series associated with the transect is Torrifluvents-Fluvaquentic Endoaquolls complex, 0-2% slopes, and is on a Moist Floodplain ecological site. During the baseline period from 2002-07, similarity index has ranged between 76% and 79%. Annual aboveground production at this riparian site has exceeded typical quantities found in the Moist Floodplain ecological site description. This site supports four perennial graminoid species and is dominated by saltgrass (*Distichlis spicata* [DISP]). The overall biomass of shrubs is typical for a Moist Floodplain ecological site. No nonnative species were detected at the site. Creeping wildrye (LETR) significantly increased in 2009 outside baseline parameters. A similar pattern was observed with LETR canopy cover. This increase would raise the similarity index even higher for 2009. Shrub cover and density appears to be decreasing on this site.

Table 4. LONEPINE_01, Comparison to Moist Flood Plain Ecological Site Description

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%				
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%	T	T		
	HECU3	0-2%				
Other Perennial Forbs		0-2%	T		1%	
Perennial Graminoids	DISP	40-60%	77% (60)	73% (60)	80% (60)	85% (60)
	SPAI	10-20%	5%	3%	1%	10%
	LETR5	5-15%	7%	10%	4%	1%
	JUBA	5-10%	T	1%	4%	2%
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	9% (3)	10% (3)	8% (3)	1%
	ERNA10	0-3%	1%	2%	3%	2%
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%				
Other Shrubs	SSSS	0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species	NONA	0%				
Total Forbs		5-10%	1%	T	1%	0%
Total Perennial Graminoids		80%	90%	88%	88%	97%
Total Shrubs		5-15%	10%	12%	11%	3%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	0%	0%
Similarity Index			76%	79%	76%	76%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 5. Utilization, Weighted Average, LONEPINE_01

2007	2008	2009
80%	42%	61%

Table 6. Utilization by Species, LONEPINE_01

	DISP	LETR5	SPAI
2007	82%		78%
2008	28%	43%	62%
2009	61%		

Table 7. Frequency (%), LONEPINE_01

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	HEAN3	0	0	0	0	2
Perennial Forb	ANCA10	0	0	0	0	2
	GLLE3	0	0	0	0	0
	MALE3	0	0	0	0	0
Perennial Graminoid	DISP	143	133	155	147	136
	JUBA	5	4	0	25	13
	LETR5	12	29	18	32	50**
	SPAI	10	13	17	19	14
Shrubs	ATTO	2	4	7	3	3
	ERNA10	0	0	4	0	0
	SUMO	3	0	0	0	0

** indicates a significant difference, α≤0.1, **≤0.05*

Table 8. Cover (%) Forbs, Graminoids, Sub-shrubs LONEPINE_01

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	HEAN3	0	0	T	0	T
Perennial Forb	ANCA10	0	0	0	0	T
	GLLE3	0	0	0	0	0
	MALE3	0	0	T	0	0
	SUMO	0	0	0	0	0
Perennial Graminoid	DISP	53	56	54	53	46
	JUBA	0	1	2	1	1
	LETR5	5	9	3	5	15
	SPAI	5	4	1	5	4

Table 9. Cover (%) Shrubs LONEPINE_01

Species	2003	2004	2007	2009
ATTO	7.1	5.2	4.7	1.8
ERNA10	2.2	2.6	2.1	0.0
SUMO	0.1	0.0	0.8	0.0
Total	9.5	7.8	7.5	1.8

Table 10. Ground Cover (%)

Substrate	2002	2003	2004	2007	2009
Bare Soil	5	5	8	9	8
Dung	6	12	4	12	2
Litter	81	60	36	81	90
Rock	0	0	0	0	0
Standing Dead	0	0	8	10	8

Table 11. Shrub Densities and Age Classes LONEPINE_01

	ATTO					ERNA10				SUMO				
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2003**	**2004**	**2007**	**2009**	**2002**	**2003**	**2004**	**2007**	**2009**
Juvenile	0	0	0	0	0	1	0	0	0	1	1	3	2	0
Mature	3	10	7	7	1	1	0	2	0	1	4	2	4	2
Decadent	0	1	4	7	4	5	1	3	1	0	0	1	1	0
Total	3	11	11	14	5	7	1	5	1	2	5	6	7	2

LONEPINE_02

This site is in a riparian management area on the west side of the Owens River, east of the Lone Pine Dump in the River Pasture. The soil series is Torrifluvents-Fuvaquentic Endoaquolls complex, 0-2% slopes, and is on a Moist Floodplain ecological site. The similarity index ranged between 65% and 87% from 2002 to 2007. The 87% similarity index occurred in 2007. The site is in excellent condition. The site is grass-dominated with saltgrass comprising the bulk of the biomass. Saltgrass frequency significantly increased in 2009 outside its historic range from 2002-07. No nonnative species were detected at the site. Utilization has dropped during the last two years but continues to remain above 40% for riparian pastures. However trend remains stable for the site.

Table 12. Utilization, Weighted Average, LONEPINE_02

2007	2008	2009
79%	45%	48%

Table 13. Utilization, by Species, LONEPINE_02

	DISP	LETR5	SPAI
2007	75%	na	85%
2008	31%	na	58%
2009	38%	na	64%

Table 14. LONEPINE_02, Comparison to Moist Flood Plain Ecological Site Description

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%				
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%				
	HECU3	0-2%				
Other Perennial Forbs		0-2%				3%
Perennial Graminoids	DISP	40-60%	71% (60)	78% (60)	37%	71% (60)
	SPAI	10-20%	23% (20)	14%	30% (20)	3%
	LETR5	5-15%				13%
	JUBA	5-10%	2%	2%	2%	5%
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	T	4% (3)	11% (3)	6% (3)
	ERNA10	0-3%	5% (3)	2%	12% (3)	T
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%				
Other Shrubs	SSSS	0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species	NONA	0%				
Total Forbs		5-10%	0%	0%	7%	3%
Total Perennial Graminoids		80%	95%	94%	69%	90%
Total Shrubs		5-15%	5%	6%	23%	6%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	0%	0%
Similarity Index			85%	81%	65%	87%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 15. Frequency (%), LONEPINE_02

Life Forms	**Species**	**2002**	**2003**	**2004**	**2007**	**2009**
Annual Forb	2FORB	0	0	0	0	0
	ATPH	0	0	0	0	0
Perennial Forb	ANCA10	0	0	0	0	0
	STEPH	0	0	0	0	0
Perennial Graminoid	DISP	146	125	142	143	164**
	JUBA	9	13	20	17	14
	LETR5	0	0	0	3	0
	SPAI	65	78	65	64	52
Shrubs	ATTO	0	0	3	0	0
	ERNA10	0	1	4	3	1

** indicates a significant difference, α≤0.1, **≤0.05*

Table 16. Cover (%) Forbs, Graminoids, Sub-shrubs LONEPINE_02

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	2FORB	0	0	0	0	0
	ATPH	0	0	0	0	0
Perennial Forb	ANCA10	0	0	1	0	0
	STEPH	0	0	0	0	0
Perennial Graminoid	DISP	48	52	8	60	51
	JUBA	1	1	0	1	1
	LETR5	0	0	0	0	0
	SPAI	23	14	9	10	11

Table 17. Cover (m) Shrubs LONEPINE_02

Shrub Canopy Cover	2003	2004	2007	2009
ATTO	2.2	2.2	0.6	0.9
ERNA10	2.1	3.3	1.8	2.4
Total	4.3	5.5	2.4	3.3

Table 18. Ground Cover (%) LONEPINE_02

Substrate	2002	2003	2004	2007	2009
Bare Soil	3.6	5.2	11.5	8.2	7.0
Dung	6.7	5.1	1.3	8.8	2.4
Litter	77.4	70.3	49.4	83.1	90.6
Rock	0.0	0.0	0.0	0.0	0.0
Standing Dead	0.0	0.0	4.3	4.2	3.8

Table 19. Shrub Densities and Age Classes LONEPINE_02

	ATTO					**ERNA10**				
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2002**	**2003**	**2004**	**2007**	**2009**
Juvenile	2	2	0	1	0	0	1	0	2	0
Mature	5	7	8	6	6	1	2	10	3	7
Decadent	2	2	1	0	2	5	10	4	3	2
Total	9	11	9	7	8	6	13	14	8	9

LONEPINE_03

This site is in a riparian management area on the west side of the Owens River in the River Pasture. The soil series is Torrifluvents-Fluvaquentic Endoaquolls complex, 0-2% slopes, and is on a Moist Floodplain ecological site.

The similarity index has ranged between 74% and 87% during sampling periods between 2002-07, indicating the site is in excellent condition. Site production has exceeded the expected based on the ecological site description in all years of sampling. The site is grass-dominated with saltgrass comprising the bulk of the biomass and creeping wildrye closely reaching the potential described for the site at 13% in 2007. Frequency for creeping wildrye increased significantly in 2009 when compared to all sampling periods during the baseline period. Overall shrub cover is minimal. No nonnative species were detected at the site. This site, based on the ecological site description and frequency trends, is stable and in excellent ecological condition.

Table 20. Utilization, Weighted Average, LONEPINE_03

2007	2008	2009
81%	46%	70%

Table 21 Utilization, by Species, LONEPINE_03

	DISP	LETR5	SPAI
2007	83%	74%	81%
2008	38%	25%	66%
2009	72%	23%	66%

Table 22. LONEPINE_03, Comparison to Moist Flood Plain Ecological Site Description

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%		1%		
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%				
	HECU3	0-2%	T			
Other Perennial Forbs		0-2%	9% (2)			3% (2)
Perennial Graminoids	DISP	40-60%	67% (60)	70% (60)	53%	71% (60)
	SPAI	10-20%	2%	T	15%	3%
	LETR5	5-15%	10%	8%	0%	13%
	JUBA	5-10%	1%	5%	0%	5%
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	12% (2)	14% (3)	28% (3)	6% (3)
	ERNA10	0-3%	T	1%	4% (3)	T
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%				
Other Shrubs	SSSS	0-3%				1%
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species	NONA	0%				
Total Forbs		5-10%	9%	1%	0%	3%
Total Perennial Graminoids		80%	79%	84%	68%	90%
Total Shrubs		5-15%	12%	15%	32%	6%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	0%	0%
Similarity Index			77%	78%	74%	87%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 23. Frequency (%), LONEPINE_03

Life Forms	**Species**	**2002**	**2003**	**2004**	**2007**	**2009**
Annual Forb	2FORB	0	1	0	0	0
	HEAN3	0	2	1	0	0
Perennial Forb	ANCA10	0	0	0	3	0
	GLLE3	12	0	7	0	5
	HECU3	0	0	0	0	0
	MALE3	7	3	5	2	5
	PYRA	7	0	0	0	0
Perennial Graminoid	DISP	151	148	152	152	142
	JUBA	39	59	52	41	43
	LETR5	34	33	31	34	52**
	SPAI	9	0	10	5	4
Shrubs	ATTO	14	2	13	0	1
	ERNA10	0	0	2	0	4

** indicates a significant difference, α≤0.1, **≤0.05*

Table 24. Cover (%) Forbs, Graminoids, Sub-shrubs LONEPINE_03

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	2FORB	0	1	0	0	0
	HEAN3	0	T	0	0	0
Perennial Forb	ANCA10	0	0	0	2	0
	GLLE3	11	0	0	2	3
	HECU3	0	0	0	0	0
	MALE3	0	0	0	0	0
	PYRA	0	0	0	0	0
Perennial Graminoid	DISP	74	73	27	77	55
	JUBA	1	6	0	5	1
	LETR5	12	9	0	15	8
	SPAI	3	0	11	4	2
Shrubs	ATTO	12	0	0	0	0
	ERNA10	1	0	0	0	0

Table 25. Cover (m) Shrubs LONEPINE_03

Species	2003	2004	2007	2009
ATTO	13.5	13.4	6.0	0.8
ERNA10	2.0	2.7	0.6	2.7
SAVE4	0.0	0.0	0.0	3.6
Total	15.5	16.1	6.6	7.2

Table 26. Ground Cover (%), LONEPINE_03

Substrate	2002	2003	2004	2007	2009
Bare Soil	0	0	0	4	1
Dung	5	8	3	6	4
Litter	88	67	52	90	95
Rock	0	0	0	0	0
Standing Dead	0	0	3	5	5

Table 27. Shrub Densities and Age Classes LONEPINE_03

	ATTO					**ERNA10**					**SAVE4**
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2002**	**2003**	**2004**	**2007**	**2009**	**2009**
Seedling	0	1	0	1	0	0	0	0	0	0	0
Juvenile	0	1	0	0	0	0	0	0	0	2	0
Mature	10	20	13	16	4	7	9	6	10	9	16
Decadent	2	4	4	4	0	0	1	1	2	1	2
Total	12	26	17	21	4	7	10	7	12	12	18

LONEPINE_04

This site is in a riparian management area on the west side of the Owens River in the River Pasture. The transect is located at the edge of the floodplain and currently incorporates a portion of the transition zone to upland vegetation. The soil series is Torrifluvents-Fluvaquentic Endoaquolls complex, 0-2% slopes at the beginning of the transect and transitions to the Mazourka-Eclipse complex, 0-2% slopes. The transition in ecological sites is from a Moist Floodplain ecological site to a Sodic Terrace ecological site. Because of the mixed soils and associated ecological sites found across the transect evaluating trend for this site will concentrate on changes on trend rather than how well the site matches ecological site descriptions.

The similarity index has ranged widely between 59% and 73% from 2002-07. Site production has generally been less than potential based on the ecological site description for a Moist Floodplain site. When compared to the Moist Floodplain ecological site description, the site has less than the expected biomass of forage species such as creeping wild rye and Baltic rush (*Juncus balticus* [JUBA]). This is explained by the transition from mesic conditions on the Moist Floodplain to more xeric conditions of the uplands which results in a decreasing abundance of creeping wildrye, Baltic rush, and riparian trees and the disproportionate amount of alkali sacaton which can better thrive in both the mesic and xeric transitional zones. The site is grass-dominated with saltgrass and alkali sacaton comprising the bulk of the biomass. The shrub component of the site is dominated by rubber rabbitbrush (*Ericameria nauseosus* [ERNA10]). As flows on the Lower Owens continue, soil moisture may rise towards the upland zone of the transect and future changes in species composition may be observed. However, frequency data indicates that there is an inverse trend, with decreasing saltgrass, and increasing alkali sacaton which is typical gradient in zones moving from wet to drier zones. No nonnative species were detected at the site. End-of-season utilization at this site has decreased over the past three years, but remains above 40%.

Table 28. Utilization, Weighted Average, LONEPINE_04

2007	2008	2009
61%	51%	43%

Table 29. Utilization, by Species, LONEPINE_04

	DISP	LETR5	SPAI
2007	52%	na	71%
2008	43%	na	59%
2009	37%	na	51%

Table 30. LONEPINE_04, Comparison to Moist Flood Plain Ecological Site Description

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%		9% (2)		
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%	1%			
	SUMO	0-2%	1%	21% (2)	2%	
	HECU3	0-2%				
Other Perennial Forbs		0-2%	10% (2)	7% (2)		11% (2)
Perennial Graminoids	DISP	40-60%	48%	29%	84% (60)	33%
	SPAI	10-20%	40% (20)	30% (20)	6%	44% (20)
	LETR5	5-15%			5%	
	JUBA	5-10%	1%	1%		2%
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%				
	ERNA10	0-3%		4% (3)	3%	10% (3)
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%				
Other Shrubs	SSSS	0-3%		T	1%	1%
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species	NONA	0%				
Total Forbs		5-10%	11%	36%	1%	11%
Total Perennial Graminoids		80%	89%	60%	95%	78%
Total Shrubs		5-15%	0%	4%	4%	11%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	0%	0%
Similarity Index			73%	59%	77%	61%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 31. Frequency (%), LONEPINE_04

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	2FORB	0	0	1	0	0
	ATPH	0	29	12	0	0
Perennial Forb	ANCA10	37	7	8	8	7
	NIOC2	114	0	0	2	2
	STEPH	3	0	11	0	5
	SUMO	0	4	6	2	3
Perennial Graminoid	DISP	105	101	114	97	88
	JUBA	2	18	25	11	15
	LETR5	0	0	0	0	0
	SPAI	48	63	56	69	79
Shrubs	ATCO	0	0	4	0	0
	ATTO	0	2	0	0	0
	ERNA10	0	2	0	0	0
	MACA17	0	0	0	4	0
	SUMO	3	0	0	0	0
Nonnative	BAHY	0	0	0	0	2

** indicates a significant difference, α<0.1, **<0.05*

Table 32. Cover (%) Forbs, Graminoids, Sub-shrubs LONEPINE_04

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	2FORB	0	0	0	0	0
	ATPH	0	3	0	0	0
Perennial Forb	ANCA10	2	2	0	3	1
	NIOC2	0	0	0	0	0
	STEPH	0	0	0	0	0
	SUMO	0	0	0	0	0
Perennial Graminoid	DISP	13	14	47	12	9
	JUBA	0	0	0	1	0
	LETR5	0	0	3	0	0
	SPAI	16	22	5	23	14
Shrubs	ATCO	0	0	0	0	0
	ATTO	0	0	0	0	0
	ERNA10	0	0	0	0	0
	MACA17	0	0	0	1	0
	SUMO	0	0	0	0	0
Nonnative	BAHY	0	0	0	0	T

Table 33. Cover (m) Shrubs LONEPINE_04

Species	2003	2004	2007	2009
ATCO	0.1	0.5	0.0	0.0
ATTO	0.0	0.0	0.0	10.0
ERNA10	2.3	2.1	4.5	1.1
SUMO	12.4	1.0	0.0	0.0
Total	14.8	3.6	4.5	11.1

Table 34. Ground Cover (m), LONEPINE_04

Substrate	2002	2003	2004	2007	2009
Bare Soil	33	37	51	42	42
Dung	5	0	1	0	1
Litter	53	54	35	56	57
Rock	0	0	0	0	0
Standing Dead	0	0	1	0	0

Table 35. Shrub Densities and Age Classes LONEPINE_04

	ERNA10					SUMO				ATCO			ATTO			
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2002**	**2003**	**2004**	**2007**	**2003**	**2004**	**2007**	**2002**	**2003**	**2007**	**2009**
Juvenile	1	0	0	1	0	3	13	11	10	0	3	1	2	4	2	0
Mature	6	6	10	3	4	5	24	23	15	1	1	2	0	1	3	4
Decadent	0	2	0	8	0	0	0	0	3	0	0	0	0	1	0	4
Total	7	8	10	12	4	8	37	34	28	1	4	3	2	6	5	8

LONEPINE_05

This site is in an upland management area in the Winnedumah fine sandy loam, 0-2% slopes soil series which is associated with a Sodic Fan ecological site, just east of the Lone Pine Airport in the Johnson Pasture. During the baseline period this site has received irrigation water reportedly tail water off of the Lone Pine Indian Reservation to the northwest. In 2004 the site flooded and was not sampled. An increase from 0 to 14 juvenile *Salix exigua* species in 2007 is evidence of this flooding.

The similarity index has ranged between 69% and 77% between 2002-07. Site production exceeded expected based on the ecological site description. The main forage species are alkali sacaton and saltgrass. As compared to site potential, this site has greater than expected biomass of forbs, dominated by American licorice (*Glycyrrhiza lepidota* [GLLE3]). Two nonnative species have been detected at the site fivehorn smotherweed (*Bassia hyssopifolia* [BAHY]) and Arabian schismus grass (*Schismus arabicus*). Nevada saltbrush (*Atriplex torreyi* [ATTO]) has decreased in density and cover over time. Saltgrass significantly increased in frequency this year but remains within baseline parameters. End-of-season utilization on this transect has consistently remained below the 65% limit for upland pastures.

Table 36. Utilization, Weighted Average, LONEPINE_05

	2007	2008	2009
LONEPINE_05	44%	2%	34%

Table 37. Utilization, by Species, LONEPINE_05

		DISP	LETR5	SPAI
LONEPINE_05	2007	23%	na	49%
	2008	9%	ne	0%
	2009	na	na	34%

Table 38. LONEPINE_05, Comparison to Sodic Fan Ecological Site Description

Ecological Site: Sodic Fan		% Composition by Weight			
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2007**
Annual Forbs	AAFF	0%			
Perennial Forbs	GLLE3	0-2%	27% (2)	7% (2)	24% (2)
Other Perennial Forbs		0-2%	T	T	3% (2)
Perennial Graminoids	SPAI	10-20%	7%	10%	21% (20)
	DISP	5-10%	3%	5%	2%
	LECI	5-10%			
	JUBA	0-2%	T		
Other Perennial Graminoids		0-2%			1%
Shrubs	ATTO	40-55%	61% (55)	76% (55)	41%
	SAVE4	5-15%			
	ATCO	2-5%			
	ERNA10	0-2%			
	ARTRW8	0-2%			
	SUMO	0-2%			
Other Shrubs		0-10%	2%	2%	9%
Nonnative Species		0%		1%	
Total Forbs		5%	27%	7%	27%
Total Perennial Graminoids		25%	10%	14%	24%
Total Shrubs		70%	63%	78%	50%
Total Nonnative Species		0%	0%	1%	0%
Similarity Index			69%	74%	77%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.					

Table 39. Frequency (%), LONEPINE_05

Life Forms	Species	2002	2003	2007	2009
Annual Forb	ATSES	0	3	0	0
	ATTR	0	3	0	0
	ERPR4	0	0	3	0
	LACO13	0	0	5	0
Perennial Forb	ARLU	0	0	5	0
	GLLE3	22	26	49	29*
	MALE3	32	11	16	8
Perennial Graminoid	ARPU9	0	0	5	0
	DISP	51	40	23	42*
	JUBA	3	4	1	0
	SPAI	43	69	73	77
Shrubs	ATTO	3	40	24	21
	SAEX	60	0	16	8
Nonnative	BAHY	0	16	0	0

** indicates a significant difference, α≤0.1, **≤0.05*

Table 40. Cover (%) Forbs, Graminoids, Sub-shrubs LONEPINE_05

Life Forms	Species	2002	2003	2007	2009
Annual Forb	ATSES	0.0	T	0.0	0.0
	ATTR	0.0	T	0.0	0.0
	ERPR4	0.0	0.0	T	0.0
	LACO13	0.0	0.0	0.1	0.0
Perennial Forb	ARLU	0.0	0.0	1.0	0.0
	GLLE3	12.6	3.8	20.9	8.0
	MALE3	0.2	0.1	0.5	0.1
Perennial Graminoid	ARPU9	0.0	0.0	0.4	0.0
	DISP	1.3	2.2	1.4	4.9
	JUBA	0.1	0.1	T	0.0
	SPAI	4.2	6.6	23.6	14.8
Shrubs	ATTO	23.8	0.0	0.0	0.0
	SAEX	1.4	0.0	0.0	0.0
Nonnative	BAHY	0.0	0.2	0.0	0.0

Table 41. Cover (m) Shrubs LONEPINE_05

Species	2003	2007	2009
ATTO	32.8	28.9	9.6
SAEX	1.5	14.5	21.1
Total	34.4	43.3	30.8

Table 42. Ground Cover (%), LONEPINE_05

Substrate	2002	2003	2004	2007	2009
Bare Soil	20	22	0	20	20
Dung	1	1	0	1	3
Litter	75	71	0	81	77
Rock	0	0	0	0	0
Standing Dead	0	0	0	19	18

Table 43. Shrub Densities and Age Classes LONEPINE_05

	ATTO				SAEX			
Age Class	**2002**	**2003**	**2007**	**2009**	**2002**	**2003**	**2007**	**2009**
Seedling	11	20	0	0	0	0	0	0
Juvenile	21	30	6	0	0	0	14	1
Mature	19	44	56	27	1	2	7	3
Decadent	3	13	20	2	0	1	0	0
Total	54	107	82	29	1	3	21	4

LONEPINE_06

This site is in a riparian management area on the east side of the Owens River in the River Pasture. This monitoring transect is located inside a riparian exclosure, constructed in February 2009. Over time the site will be used as a non-grazed reference site. The soil series is Torrifluvents-Fluvaquentic Endoaquolls complex, 0-2% slopes on a Moist Floodplain ecological site.

The similarity index has ranged between 66% and 84% between 2003 and 2007. Site production has varied during the baseline period from above to below that expected based on the ecological site description. Compared to the potential outlined in the ecological site description, this site lacks the forb and woody riparian species component. The forage base is dominated by saltgrass and alkali sacaton. Other forage species such as creeping wild rye and Baltic rush are lacking at this site. One nonnative species, fivehorn smotherweed, has been detected at the site. Frequency results in 2009 indicated that trend continues to be static. The exclosure was completed in February 2009 and was minimally grazed by livestock in early January. Utilization was not estimated in 2009 because the site is now inside a livestock grazing exclosure.

Table 44. Utilization, Weighted Average, LONEPINE_06

	2007	2008	2009
LONEPINE_06	78%	42%	na

Table 45. Utilization, by Species, LONEPINE_06

		DISP	LETR5	SPAI
LONEPINE_06	2007	77%	na	84%
	2008	18%	na	66%

Table 46. Frequency (%), LONEPINE_06

Life Forms	Species	2003	2004	2005	2007	2009
Perennial Forb	ANCA10	0	0	0	5	3
Perennial Graminoid	DISP	124	136	132	149	145
	JUBA	0	0	0	0	0
	SPAI	25	28	29	16	20
Nonnative	BAHY	0	0	5	0	0

** indicates a significant difference, α≤0.1, **≤0.05*

Table 47. LONEPINE_06, Comparison to Moist Floodplain Ecological Site Description

Ecological Site: Moist Floodplain		% Composition by Weight				
Functional Group	**Species**	**Site Potential**	**2003**	**2004**	**2005**	**2007**
Annual Forbs	AAFF	Trace to 2%				
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%	T	1%	T	
	HECU3	0-2%				
Other Perennial Forbs		0-2%				2%
Perennial Graminoids	DISP	40-60%	83% (60)	72% (60)	85% (60)	94% (60)
	SPAI	10-20%	16%	25% (20)	13%	3%
	LETR5	5-15%				
	JUBA	5-10%		1%		
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	1%	2%	1%	1%
	ERNA10	0-3%				
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%				
Other Shrubs	SSSS	0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species	NONA	0%			T	
Total Forbs		5-10%	0%	1%	0%	2%
Total Perennial Graminoids		80%	99%	98%	98%	97%
Total Shrubs		5-15%	1%	2%	1%	1%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	0%	0%
Similarity Index			77%	84%	74%	66%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 48. Cover (%) Forbs, Graminoids, Sub-shrubs LONEPINE_06

Life Forms	Species	2003	2004	2005	2007	2009
Perennial Forb	ANCA10	0	0	0	1	0
Perennial Graminoid	DISP	46	27	35	55	52
	JUBA	0	0	0	0	0
	SPAI	13	14	8	3	6
Nonnative	BAHY	0	0	T	0	0

Table 49. Cover (m) Shrubs LONEPINE_06

Species	2003	2004	2005	2007	2009
ATTO	0.5	0.6	0.4	0.5	1.4
SUMO	0.1	0.3	0.2	0.0	0.0
Total	0.5	0.8	0.6	0.5	1.4

Table 50. Ground Cover (%), LONEPINE_06

Substrate	2003	2004	2005	2007	2009
Bare Soil	3	13	13	15	4
Dung	12	14	18	15	3
Litter	75	40	62	70	93
Rock	0	0	0	0	0
Standing Dead	0	3	0	0	1

Table 51. Shrub Densities and Age Classes LONEPINE_06

	ATTO					SAVE4			SUMO			
Age Class	**2003**	**2004**	**2005**	**2007**	**2009**	**2003**	**2005**	**2009**	**2003**	**2004**	**2005**	**2007**
Seedling	0	0	2	0	0	0	0	0	0	0	0	0
Juvenile	0	0	0	0	0	0	0	0	2	0	6	0
Mature	1	3	3	1	1	1	1	1	8	5	3	1
Decadent	2	0	0	1	0	0	0	1	0	0	0	0
Total	3	3	5	2	1	1	1	2	10	5	9	1

LONEPINE_07

This site is in a riparian management area on the east side of the Owens River in the River Pasture. This site was first established in the summer of 2007. The soil series is Torrifluvents-Fluvaquentic Endoaquolls complex, 0-2% slopes on a Moist Floodplain ecological site.

The similarity index was 60% in 2007. Site production was similar to that expected based on the ecological site description. There is a low diversity of perennial graminoids as the only species detected was saltgrass while other forage species such as alkali sacaton and creeping wild rye are lacking on the transect but are present in the area. The biomass of forbs and riparian woody species is less than expected as compared to the desired plant community. No nonnative species were detected at the site. Baseline utilization is not available for this site since it was not established until the summer of 2007. Between 2007 and 2009 frequency has not changed significantly on the site. Ground cover remained static between the two sampling periods as well.

Table 52. Utilization, Weighted Average, LONEPINE_07

2007	2008	2009
na	44%	51%

Table 53. Utilization, by Species, LONEPINE_07

	DISP	LETR5	SPAI
2008	44%	na	na
2009	51%	na	na

Table 54. LONEPINE_07, Comparison to Moist Floodplain Ecological Site Description

Ecological Site: Moist Floodplain		% Comp by Weight	
Functional Group	**Species**	**Site Potential**	**2007**
Annual Forbs	AAFF	Trace to 2%	
Perennial Forbs	PYRA	0-2%	
	NIOC2	0-2%	
	SUMO	0-2%	
	HECU3	0-2%	
Other Perennial Forbs		0-2%	
Perennial Graminoids	DISP	40-60%	100% (60)
	SPAI	10-20%	
	LETR5	5-15%	
	JUBA	5-10%	
	CAREX	0-5%	
	POSE	0-5%	
	LECI	0-5%	
Other Perennial Graminoids		0-5%	
Shrubs	ATTO	0-3%	
	ERNA10	0-3%	
	ROWO	0-3%	
	SAEX	0-3%	
	SAVE4	0-3%	
Other Shrubs	SSSS	0-3%	
Trees	POFR2	2-5%	
	SALA3	2-5%	
Nonnative Species	NONA	0%	
Total Forbs		5-10%	0.0%
Total Perennial Graminoids		80%	100.0%
Total Shrubs		5-15%	0.0%
Total Trees		4-10%	0.0%
Total Nonnative Species		0%	0.0%
Similarity Index			60%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.			

Table 55. Frequency (%), LONEPINE_07

Life Forms	Species	2007	2009
Perennial Graminoid	DISP	150	157

** indicates a significant difference, α≤0.1, **≤0.05*

Table 56. Cover (%) Forbs, Graminoids, Sub-shrubs LONEPINE_07

Life Forms	Species	2007	2009
Perennial Graminoid	DISP	49	40

No shrubs present on site.

Table 57. Ground Cover (%), LONEPINE_07

Substrate	2007	2009
Bare Soil	21	19
Dung	7	8
Litter	72	73
Rock	0	0

Irrigated Pastures

The irrigated pastures within the LORP project area for the Lone Pine Lease are the Edwards, Richards, Smith, Old Place and Van Norman Pastures. All of these pastures were rated in 2007 with the exception of the Van Norman Pasture. The Van Norman Pasture was not irrigated in 2007-08 due to the irrigation waterpump burning up. There was no irrigation water available for this pasture thus it could not meet the irrigated pasture evaluation criteria and was not rated. However, the remaining pastures within the project area on the lease were rated. All pastures except the Edwards and Richards Pastures met the minimum allowed score of 80%. In 2008 Edwards Pasture scored 80% and Richards Pasture scored 82%.

In 2009 the Edwards and Richards Pastures were evaluated again and both had improved. Edwards Pasture scored 94% and the Richards Pasture scored 92%. The main reason for improvement in these pastures was better water management.

Table 58. Irrigated Pasture Condition Scores 2007-09

Pasture	2007	2008	2009
Edwards	80	80	94
Richards	64	82	92
Van Norman	X	X	X
Smith	88	X	X
Old Place	86	X	X

X indicates no evaluation made.

Stock Water Sites

There is one stock water site planned for the Lone Pine Lease located in the River Pasture. The approximate location is two miles east of the river on an existing playa area. The bid for the contract to drill the well has gone out and it is expected to be drilled in 2010. Once this occurs installation of the watering site will begin.

Fencing

Fencing for the Lone Pine Lease consisted of replacing the existing River Pasture Riparian fence located on the west side of the river between Lone Pine Depot Road and Keeler Bridge and building an exclosure in the River Pasture.

The River Pasture Riparian fence has been completed but, some modifications were made to the original fence location near the dump. Changes were necessary because of the eastward expansion of the Lone Pine Dump.

The riparian exclosure is located within the River Pasture and was constructed in 2009. The location incorporates two river bends around the range trend transect Lone Pine_6.

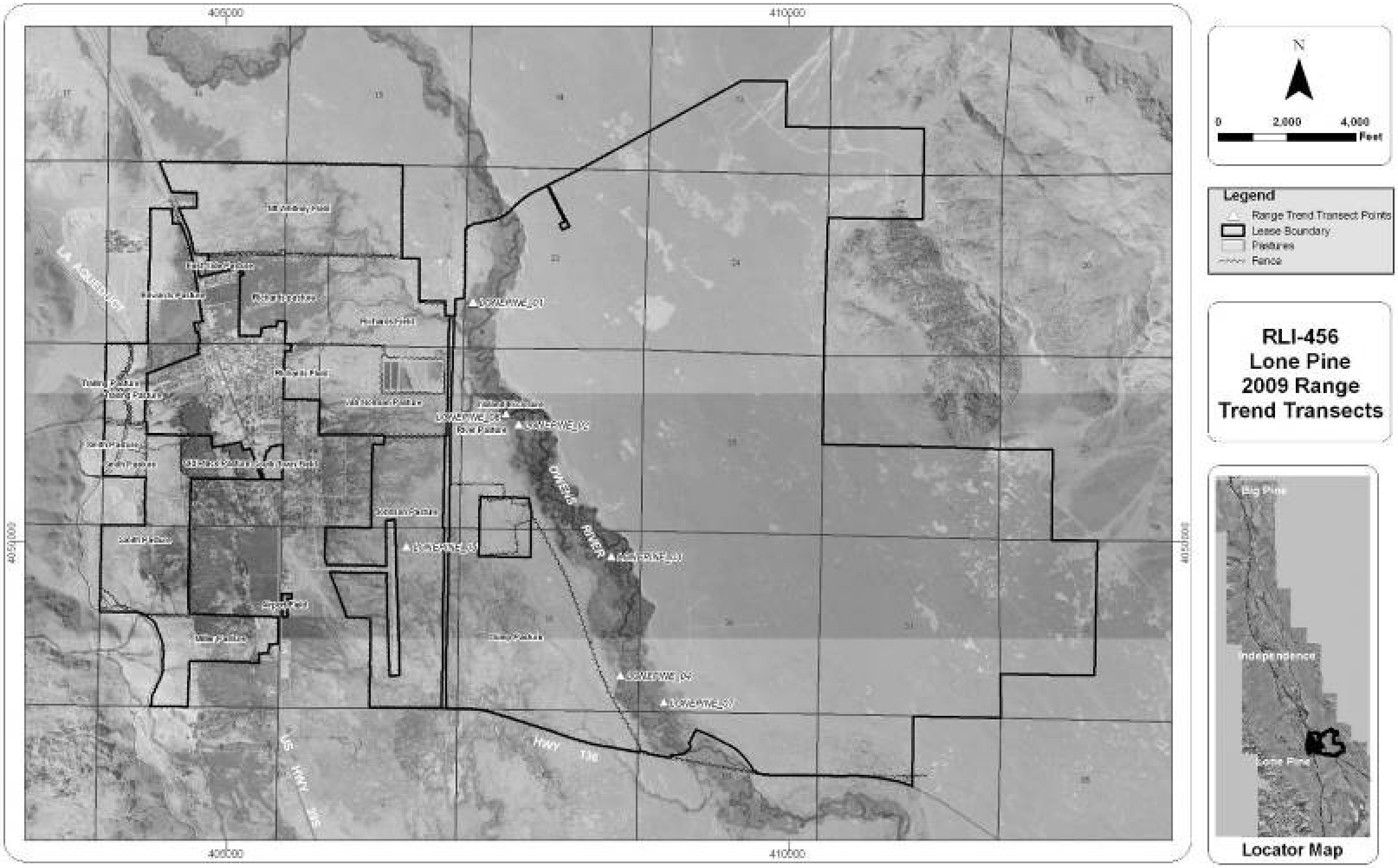
There was one other fence constructed by the lessee in 2009. This was a drift fence located north of U.S. Highway 136 and east of the river. The fence connected into an existing cattle guard and extends east for one mile. The purpose of the fence is to stop cattle from drifting on to the highway. All of the supplies for the fence were provided by LADWP.

Salt and Supplement Site:

There are numerous supplement sites located on the Lone Pine Lease and most occur within the floodplain. These supplement sites are going to now be rotated in an effort to keep them away from the river and decrease the amount of disturbed sites in the flood plain. Numerous supplement sites were noted in the floodplain of the River Pasture during the 2007 RAS, but none were identified during the 2008-09 RAS.

Burning

There were no controlled burns on the lease in 2009.



Land Use Figure 6. Lone Pine Lease RLI-456, Range Trend Transects

6.7.7. Delta Lease (RLI-490)

The Delta Lease is a cow/calf operation and consists of 7,110 acres divided into four pastures. There are four fields located with the LORP project boundary: Lake Field, Bolin Field, Delta Field, and the East Field. Grazing typically occurs for 6 months, from mid-November to April. Grazing in the Bolin Field may occur during the growing season. The Delta and Islands Leases are managed as one with State lands leases.

Grazing utilization is currently only conducted in the Main Delta Field which contains the Owens River. Two utilization transects were established in the Bolin Field at the end of the 2008-09 grazing season. Utilization in this field will be measured in the 2009-10 grazing season. The Lake Field is evaluated using irrigated pasture condition scoring. The East Field, located on the upland of Owens Lake supports little in the way of forage and also has no stockwater.

<u>Summary of Utilization</u>

The following tables present the summarized utilization data for each pasture, for the transects in each pasture, and by species for each transect for the current year.

Table 1. End of Grazing Season Utilization for Pastures on the Delta Lease, RLI-490

Delta Field*	51%

**Riparian pastures (40% utilization standard)*

Table 2. End of Grazing Season Utilization for Transects on the Delta Lease, RLI-490.

Pasture	Transect	
Delta Field*	DELTA_01	59%
	DELTA_03	54%
	DELTA_04	56%
	DELTA_05	54%
	DELTA_06	31%
	DELTA_07	51%

**Riparian pastures (40% utilization standard)*

Table 3. Utilization Levels at Each Transect at the Species Level, Delta Lease

		Grass Species	
Pasture	**UT Transect Name**	**DISP**	**SPAI**
Delta Field	DELTA_01	61%	49%
	DELTA_03	54%	
	DELTA_04	56%	
	DELTA_05	54%	
	DELTA_06	31%	
	DELTA_07	51%	

Riparian Management Areas

Use on the Delta Lease exceeded current management objectives in the riparian zones by 11%. For the last three years utilization on the Delta Riparian pasture has exceeded the 40% limit for riparian pastures, with 52% in 2007, 51% in 2008, and 51% in 2009. However, due to the timing of the seasonal habitat flow in 2008, the lessee was unable to adhere to his normal livestock grazing rotation. LADWP is encouraging the lessee to make changes so utilization standard of 40% in the Main Delta Pasture will not be exceeded. Because of the lower utilization levels observed on the Islands Lease, the higher utilization on the Delta Lease could be offset by moving cattle. It may also be offset by the increased amount of forage being produced on the Owens Lake Delta. Planned burns and the result increase in forage on the Islands Lease will also assist in reducing grazing pressure on the Delta Lease.

2010 Grazing Season

The following tables present the summarized utilization data for each pasture, for the transects in each pasture, and by species for each transect for the current year.

Table 4. Target Stubble Heights (in) for Key Species by Pasture, Delta Lease

	Grass Species	
Pasture	**DISP**	**SPAI**
Delta Field	4	6
Bolin Field	2	

Summary of Range Trend Data and Conditions

Range trend transects on the Delta Lease are located on Moist Floodplain ecological sites. Monitoring site photos are presented in Appendix 3 – Section 7. The similarity index averaged at each transect, over the four baseline sampling periods ranged between 48-70%. All sites lack a diversity of perennial grasses, and are dominated by saltgrass. The presence of alkali sacaton appears to follow a gradient with decreasing abundance following a decrease in elevation. Soil salinity appears to increase along this same gradient as soils transition from stream deposition to lacustrine deposition from the Owens Dry Lake. Alkali sacaton and beardless wildrye are both know to not have as high a tolerance for saline soils as saltgrass (USDA, NRCS 2009). These variables may be influencing species composition on the Moist Floodplain zones on the Delta Lease. The only significant change in plant frequency from 2007-09 occurred on Delta_07 with an increase in saltgrass, this increase still remained within the range of variability during the baseline period.

Three additional range trend transects (DELTA_08, DELTA_09, DELTA_10) were established on the State Lands section of the Delta in July 2009. The sites are located on playa soils and are dominated by saltgrass with a minor forb component. Saltgrass production was high on all sites. Shrubs were absent on all four sites. Because sampling occurred only once (July 2009), trend will not be discussed at this time for the four new sites.

DELTA_01

DELTA_01 is located in the Delta Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. The similarity index varied between 67-72% during the baseline period. The site is dominated by saltgrass with a small alkali sacaton component. Frequency in 2009 did not differ from 2007. The site has remained stable. Utilization has exceeded the 40% standard for all three years of sampling.

Table 5. DELTA_01 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%				
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%	2%	1%	1%	0%
	SUMO	0-2%	1%	1%	1%	0%
	HECU3	0-2%				
Other Perennial Forbs		0-2%	3% (2)	3% (2)	3% (2)	2%
Perennial Graminoids	DISP	40-60%	87% (60)	87% (60)	89% (60)	90%(60)
	SPAI	10-20%	2%	2%	3%	2%
	LETR5	5-15%				
	JUBA	5-10%		3%	0%	0%
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	5%(3)	4%(3)	4%(3)	6% (3)
	ERNA10	0-3%				
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%				
Other Shrubs	SSSS	0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species	NONA	0%				
Total Forbs		5-10%	6%	4%	5%	2%
Total Perennial Graminoids		80%	89%	91%	91%	92%
Total Shrubs		5-15%	5%	4%	4%	6%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	0%	0%
Similarity Index			70%	72%	70%	67%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 6. Utilization, Weighted Average, Delta_01

2007	**2008**	**2009**
50%	49%	59%

Table 7. Utilization by Species, Delta_01

	DISP	SPAI
2007	46%	69%
2008	46%	58%
2009	61%	49%

Table 8. Frequency (%), DELTA_01

Life Forms	Species	2002	2003	2004	2007	2009
Perennial Forb	ANCA10	5	12	5	7	11
	NIOC2	10	5	7	4	3
	SUMO	7	0	1	0	0
Perennial Graminoid	DISP	156	152	149	152	155
	JUBA	0	7	11	10	9
	LETR5	0	1	0	0	0
	SPAI	3	0	13	11	16
Shrubs	ATTO	2	5	1	5	0
	SUMO	0	0	0	0	0
Nonnative	BAHY	5	0	2	0	2

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 9. Cover (%) Forbs, Graminoids, Sub-shrubs DELTA_01

Life Forms	Species	2002	2003	2004	2007	2009
Perennial Forb	ANCA10	2	2	1	1	2
	NIOC2	2	1	1	T	T
	SUMO	1	0	0	0	0
Perennial Graminoid	DISP	70	66	46	60	61
	JUBA	0	2	T	T	T
	LETR5	0	0	0	0	0
	SPAI	3	2	3	2	3
Nonnative Species	BAHY	0	0	T	0	T

Table 10. Cover (m) Shrubs DELTA_01

Species	2003	2004	2007	2009
ATTO	3.1	1.8	3.9	1.1
SUMO	0.9	0.8	0.2	0.1
Total	4.0	2.7	4.1	1.2

Table 11. Ground Cover (%) DELTA_01

Substrate	2002	2003	2004	2007	2009
Bare Soil	5	0	0	0	0
Dung	6	9	13	4	5
Litter	81	77	47	87	92
Rock	0	0	0	0	0
Standing Dead	0	0	4	1	2
Bare Ground	0	4	22	9	3

Table 12. Shrub Densities and Age Classes DELTA_01

	ATTO				SUMO		
Age Class	**2003**	**2004**	**2007**	**2009**	**2003**	**2004**	**2009**
Seedling	7	0	0	0	0	0	0
Juvenile	3	7	3	0	0	0	0
Mature	8	8	8	10	3	4	1
Decadent	0	0	2	0	0	0	0
Total	18	15	13	10	3	4	1

DELTA_02

DELTA_02 is located in a grazing exclosure in the Delta Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes which corresponds to the Moist Floodplain ecological site. Similarity index ranged between 59-66% during the baseline period. Plant frequencies in 2009 did not change when compared to 2007. Both Nevada saltbush and rubber rabbitbrush cover appears to be trending downwards. Because the transect is now within an exclosure, utilization was not sampled in 2009.

Table 13. DELTA_02 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%				
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%		T	0%	0%
	HECU3	0-2%				
Other Perennial Forbs		0-2%				
Perennial Graminoids	DISP	40-60%	78%(60)	56%	53%	62% (60)
	SPAI	10-20%				
	LETR5	5-15%				
	JUBA	5-10%				
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	22% (3)	25%(2)	24% (3)	20% (3)
	ERNA10	0-3%		18% (3)	22% (3)	17% (3)
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%				
Other Shrubs	SSSS	0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species	NONA	0%		T		
Total Forbs		5-10%	0%	0%	0%	0%
Total Perennial Graminoids		80%	78%	56%	53%	62%
Total Shrubs		5-15%	22%	44%	47%	38%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	0%	0%
Similarity Index			63%	61%	59%	66%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 14. Utilization, Weighted Average, Delta_02

2007	**2008**
52%	49%

Table 15. Utilization by species, Delta_02

	DISP	SPAI
2007	48%	70%
2008	49%	

Table 16. Frequency (%), DELTA_02

Life Forms	Species	2002	2003	2004	2007	2009
Perennial Graminoid	DISP	109	118	131	103	115
Shrubs	ATTO	10	13	0	0	4
	ERNA10	10	9	12	0	1
Nonnative Species	BAHY	0	3	0	0	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 17. Cover (%) Forbs, Graminoids, Sub-shrubs DELTA_02

Life Forms	Species	2002	2003	2004	2007	2009
Perennial Graminoid	DISP	42	38	23	33	26
Nonnative Species	BAHY	0	T	0	0	0

Table 18. Cover (m) Shrubs DELTA_02

Species	2003	2004	2007	2009
ATTO	16.3	9.7	10.1	8.3
ERNA10	16.0	12.3	11.7	10.8
SUMO	0.4	0.0	0.0	0.0
Total	32.6	22.0	21.8	19.0

Table 19. Ground Cover (%) DELTA_02

Substrate	2002	2003	2004	2007	2009
Bare Soil	11	0	0	0	0
Dung	2	2	2	3	1
Litter	82	75	49	68	69
Rock	0	0	0	0	0
Standing Dead	0	0	6	2	9
Bare Ground	0	17	29	27	30

Table 20. Shrub Densities and Age Classes DELTA_02

	ATTO					ERNA10				
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2002**	**2003**	**2004**	**2007**	**2009**
Seedling	0	23	0	11	0	0	0	0	0	0
Juvenile	0	20	6	17	0	2	7	2	1	0
Mature	6	24	24	24	4	9	49	46	7	9
Decadent	0	5	4	6	12	11	8	5	34	9
Total	6	72	34	58	16	22	64	53	42	18

DELTA_03

DELTA_03 is located in the Delta Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, which corresponds to the Moist Floodplain ecological site. The site is predominantly saltgrass. Frequency vales did not differ from 2007-09. Alkali sacaton was not encountered. Utilization has ranged between 19-11% above the 40% riparian standard.

Table 21. DELTA_03 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%				
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%	6% (2)	20% (2)	12%	5% (2)
	HECU3	0-2%				
Other Perennial Forbs		0-2%				
Perennial Graminoids	DISP	40-60%	69% (60)	56%	53%	65% (60)
	SPAI	10-20%	5%	0%	0%	0%
	LETR5	5-15%				
	JUBA	5-10%				
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	19% (3)	17% (3)	23% (3)	21% (3)
	ERNA10	0-3%		1%	1%	2%
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%	1%	6% (3)	11% (3)	7% (3)
Other Shrubs	SSSS	0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species	NONA	0%				
Total Forbs		5-10%	6.1%	20.4%	12.0%	5.5%
Total Perennial Graminoids		80%	74.0%	56.0%	52.9%	65.2%
Total Shrubs		5-15%	19.9%	23.6%	35.1%	29.3%
Total Trees		4-10%	0.0%	0.0%	0.0%	0.0%
Total Nonnative Species		0%	0.0%	0.0%	0.0%	0.0%
Similarity Index			71%	65%	72%	68%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 22. Utilization, Weighted Average, Delta_03

2007	**2008**	**2009**
59%	51%	54%

Table 23. Utilization by Species, Delta_03

	DISP	SPAI
2007	59%	57%
2008	50%	69%
2009	54%	

Table 24. Frequency (%), DELTA_03

Life Forms	Species	2002	2003	2004	2007	2009
Perennial Forb	SUMO	15	15	19	0	15
Perennial Graminoid	DISP	114	118	129	104	119
	SPAI	5	0	0	1	0
Shrubs	ATTO	12	13	8	0	8
	ERNA10	0	0	0	0	2
	SAVE4	0	0	10	0	0
	SUMO	0	0	0	0	0
Nonnative	BAHY	15	1	0	0	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 25. Cover (%) Forbs, Graminoids, Sub-shrubs DELTA_03

Life Forms	Species	2002	2003	2004	2007	2009
Perennial Forb	SUMO	4	0	0	0	0
Perennial Graminoid	DISP	37	38	19	36	18
	SPAI	4	T	0	T	0
Nonnative	BAHY	0	0	0	0	0

Table 26. Cover (m) Shrubs DELTA_03

Species	2003	2004	2007	2009
ATTO	11.0	7.7	10.9	7.3
ERNA10	0.7	0.4	1.1	0.8
SAVE4	6.6	6.3	5.9	5.9
SUMO	17.2	5.2	3.7	9.5
Total	35.4	19.7	21.7	23.4

Table 27. Ground Cover (%) DELTA_03

Substrate	2002	2003	2004	2007	2009
Bare Soil	21	0	0	0	0
Dung	8	2	2	6	5
Litter	64	70	48	53	58
Rock	0	0	0	0	0
Standing Dead	0	0	3	3	6
Bare Ground	0	20	32	38	37

Table 28. Shrub Densities and Age Classes DELTA_03

	ATTO					ERNA10				SAVE4			
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2003**	**2004**	**2007**	**2009**	**2003**	**2004**	**2007**	**2009**
Seedling	0	22	0	0	0	0	0	0	0	0	0	0	0
Juvenile	3	19	16	3	23	0	0	0	0	0	0	0	0
Mature	19	26	29	28	30	0	2	2	2	2	3	1	2
Decadent	0	15	0	13	8	2	0	1	0	2	0	1	0
Total	22	82	45	44	61	2	2	3	2	4	3	2	2

Table 28. Continued.

	SUMO				
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**
Seedling	2	112	0	0	0
Juvenile	15	90	58	68	20
Mature	15	73	61	17	102
Decadent	0	3	0	12	0
Total	32	278	119	97	122

DELTA_04

DELTA_04 is located in the Delta Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. Similarity index ranged between 63-71% during the baseline period. The site has remained relatively stable since vegetative sampling began, there were no significant changes in frequency values between 2007-09. Utilization has remained above the 40% riparian standard during the past three years of sampling.

Table 29. DELTA_04 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%		2%		
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%		4% (2)	3% (2)	3% (2)
	HECU3	0-2%				
Other Perennial Forbs		0-2%				
Perennial Graminoids	DISP	40-60%	83% (60)	82% (60)	83% (60)	89% (60)
	SPAI	10-20%		2%	4%	
	LETR5	5-15%				
	JUBA	5-10%				
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	17% (3)	10% (3)	9% (3)	7% (3)
	ERNA10	0-3%				
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%	T	1%	2%	T
Other Shrubs	SSSS	0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species	NONA	0%				
Total Forbs		5-10%	0%	2%	0%	0%
Total Perennial Graminoids		80%	83%	84%	87%	89%
Total Shrubs		5-15%	17%	10%	11%	8%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	0%	0%
Similarity Index			63%	68%	71%	65%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 30. Utilization, Weighted Average, Delta_04

2007	**2008**	**2009**
66%	44%	56%

Table 31. Utilization by Species, Delta_04

	DISP	SPAI
2007	65%	79%
2008	41%	56%
2009	56%	

Table 32. Frequency (%), DELTA_04

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATPH	0	7	0	0	4
Perennial Forb	SUMO	0	7	0	0	1
Perennial Graminoid	DISP	139	128	150	103	115
	SPAI	0	5	6	0	0
Shrubs	ATTO	3	2	6	0	0
	SAVE4	0	0	0	0	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 33. Cover (%) Forbs, Graminoids, Sub-shrubs DELTA_04

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATPH	0	T	0	0	T
Perennial Forb	SUMO	0	0	0	0	0
Perennial Graminoid	DISP	46	33	22	40	20
	SPAI	0	1	1	0	0

Table 34. Cover (m) Shrubs DELTA_04

Species	2003	2004	2007	2009
ATTO	3.6	2.3	3.1	5.3
SAVE4	0.3	0.6	0.2	0.2
SUMO	1.9	0.9	1.8	2.6
Total	5.9	3.8	5.1	8.1

Table 35. Ground Cover (%) DELTA_04

Substrate	2002	2003	2004	2007	2009
Bare Soil	19	0	0	0	0
Dung	6	4	3	5	7
Litter	62	59	26	31	35
Rock	0	0	0	0	0
Standing Dead	0	0	1	1	0
Bare Ground	0	34	54	63	57

Table 36. Shrub Densities and Age Classes DELTA_04

	ATTO					SAVE4		SUMO				
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2003**	**2007**	**2002**	**2003**	**2004**	**2007**	**2009**
Seedling	1	2	0	0	0	0	0	0	14	0	0	0
Juvenile	1	5	2	2	3	0	0	2	11	18	3	26
Mature	5	13	13	11	13	1	0	1	10	7	3	34
Decadent	2	1	0	0	1	0	1	0	1	1	0	0
Total	9	21	15	13	17	1	1	3	36	26	6	60

DELTA_05

DELTA_05 is located in the Delta Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site.
The similarity index ranged between 66-72% during the baseline period. The site has remained relatively stable since vegetative sampling began, there were no significant changes in frequency values between 2007-09. Utilization has remained above the 40% riparian standard during the past three years of sampling.

Table 37. DELTA_05 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%				
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%	2%		T	
	SUMO	0-2%	7%(2)	16% (2)	14% (2)	12% (2)
	HECU3	0-2%				
Other Perennial Forbs		0-2%			T	3% (2)
Perennial Graminoids	DISP	40-60%	89% (60)	69% (60)	72%(60)	70% (60)
	SPAI	10-20%				
	LETR5	5-15%				
	JUBA	5-10%	2%	5%	5%	4%
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%		10% (3)	8% (3)	11% (3)
	ERNA10	0-3%				1%
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%				
Other Shrubs	SSSS	0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species	NONA	0%		T	T	
Total Forbs			9%	16%	14%	15%
Total Perennial Graminoids		80%	91%	74%	77%	74%
Total Shrubs		5-15%	0%	10%	8%	12%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	0%	0%
Similarity Index			66%	70%	70%	72%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 38. Utilization, Weighted Average, Delta_05

2007	**2008**	**2009**
50%	60%	54%

Table 39. Utilization by Species, Delta_05

	DISP
2007	50%
2008	60%
2009	54%

Table 40. Frequency (%), DELTA_05

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	HEAN3	0	2	0	0	0
Perennial Forb	ANCA10	0	0	1	3	8
	NIOC2	7	0	2	0	0
	SUMO	14	2	23	19	16
Perennial Graminoid	CADO2	0	2	5	0	0
	CAREX	0	0	0	0	4
	DISP	155	146	163	135	144
	JUBA	9	9	12	13	23
Shrubs	ATTO	0	6	5	0	1
	SUMO	0	0	0	0	0
Nonnative Species	BAHY	0	1	3	0	1
	LASE	0	10	0	0	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 41. Cover (%) Forbs, Graminoids, Sub-shrubs DELTA_05

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	HEAN3	0	T	0	0	0
Perennial Forb	ANCA10	0	0	T	1	1
	NIOC2	2	0	T	0	0
	SUMO	5	0	0	0	0
Perennial Graminoid	CADO2	0	T	T	0	0
	CAREX	0	0	0	0	T
	DISP	54	46	31	33	24
	JUBA	2	4	2	2	1
Nonnative Species	BAHY	0	T	T	0	T
	LASE	0	T	0	0	0

Table 42. Cover (m) shrubs DELTA_05

Species	2003	2004	2007	2009
ATTO	6.5	3.4	4.8	5.9
ERNA10	0.0	0.0	0.6	1.2
SUMO	12.7	7.2	6.9	6.7
Total	19.2	10.6	12.2	13.8

Table 43. Ground cover (%) DELTA_05

Substrate	2002	2003	2004	2007	2009
Bare Soil	6	0	0	0	0
Dung	11	7	4	5	11
Litter	40	79	45	69	71
Rock	0	0	0	0	0
Standing Dead	0	0	2	3	1
Bare Ground	0	7	21	25	18

Table 44. Shrub Densities and Age Classes DELTA_05

	ATTO					ERNA10		SUMO				
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2007**	**2009**	**2002**	**2003**	**2004**	**2007**	**2009**
Seedling	0	0	0	0	0	0	0	5	50	0	0	0
Juvenile	0	5	0	0	0	6	0	11	18	11	31	28
Mature	7	10	14	9	6	1	2	23	74	42	15	39
Decadent	1	1	2	7	4	0	0	1	2	7	21	1
Total	8	16	16	16	10	7	2	40	144	60	67	68

DELTA_06

DELTA_06 is located in the Delta Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, which corresponds to the Moist Floodplain ecological site. The similarity index ranged between 54-73% during the baseline period, this variation is a result of annual fluctuations in saltgrass production. Saltgrass frequency followed a similar decline in 2003 but has remained stable for all other sampling periods. There were no significant changes in frequency values between 2007-09. Utilization has varied above and below the 40% riparian standard during the past three years of sampling.

Table 45. DELTA_06 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%				
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%	13% (2)	19% (2)	10% (2)	23% (2)
	HECU3	0-2%	2%	1%	2%	
Other Perennial Forbs		0-2%	4% (2)	1%	2%	4% (2)
Perennial Graminoids	DISP	40-60%	59%	39%	58%	43%
	SPAI	10-20%				
	LETR5	5-15%				
	JUBA	5-10%	1%	4%	2%	1%
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%	10% (3)	22% (3)	14% (3)	17% (3)
	ERNA10	0-3%		1%	1%	1%
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%	12% (3)	13% (3)	12% (3)	11% (3)
Other Shrubs	SSSS	0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species	NONA	0%		T		
Total Forbs		5-10%	18%	21%	13%	27%
Total Perennial Graminoids		80%	60%	43%	59%	44%
Total Shrubs		5-15%	22%	36%	28%	29%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	0%	0%
Similarity Index			72%	54%	73%	55%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 46. Utilization, Weighted Average, Delta_06

2007	2008	2009
26%	50%	31%

Table 47. Utilization by Species, Delta_06

	DISP
2007	26%
2008	50%
2009	31%

Table 48. Frequency (%), DELTA_06

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATPH	0	0	0	0	5
Perennial Forb	ANCA10	9	5	5	7	6
	HECU3	9	7	8	2	0
	SUMO	15	14	27	6	18
Perennial Graminoid	DISP	122	94	120	125	120
	JUBA	17	12	14	12	11
Shrubs	ATTO	3	4	0	2	2
	ERNA10	0	3	0	0	0
	SAVE4	0	1	15	0	4
	SUMO	0	0	0	0	0
Nonnative Species	BAHY	0	5	0	0	0
	XAST	0	2	0	0	0

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 49. Cover (%) Forbs, Graminoids, Sub-shrubs DELTA_06

Life Forms	Species	2002	2003	2004	2007	2009
Annual Forb	ATPH	0	0	0	0	T
Perennial Forb	ANCA10	2	T	T	1	3
	HECU3	1	T	1	T	0
	SUMO	8	0	0	0	0
Perennial Graminoid	DISP	31	16	19	16	15
	JUBA	1	2	1	T	T
Nonnative Species	BAHY	0	T	0	0	0
	XAST	0	T	0	0	0

Table 50. Cover (m) Shrubs DELTA_06

Species	2003	2004	2007	2009
ATTO	8.2	4.5	5.9	4.9
ERNA10	0.4	0.6	0.6	0.0
SAVE4	8.3	6.6	6.5	8.7
SUMO	9.4	3.9	10.6	7.0
Total	26.2	15.6	23.6	20.6

Table 51. Ground Cover (%) DELTA_06

Substrate	2002	2003	2004	2007	2009
Bare Soil	16	0	0	0	0
Dung	1	0	0	0	0
Litter	61	77	29	55	71
Rock	0	0	0	0	0
Standing Dead	0	0	17	10	5
Bare Ground	0	20	33	45	29

Table 52. Shrub Densities and Age Classes DELTA_06

	ATTO					ERNA10			
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2002**	**2003**	**2004**	**2007**
Seedling	0	8	0	0	1	0	0	0	0
Juvenile	0	6	3	1	2	2	7	0	0
Mature	8	8	16	10	8	4	1	3	1
Decadent	0	8	9	7	8	0	0	0	0
Total	8	30	28	18	19	6	8	3	1

Table 52. Continued.

	SAVE4					SUMO				
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**	**2002**	**2003**	**2004**	**2007**	**2009**
Seedling	0	0	0	0	0	5	6	0	0	12
Juvenile	0	0	0	1	0	1	42	22	37	12
Mature	1	5	11	6	9	12	31	39	31	23
Decadent	0	2	3	4	2	1	17	7	1	20
Total	1	7	14	11	11	19	96	68	69	67

DELTA_07

DELTA_07 is located in the Delta Field, soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes which corresponds to the Moist Floodplain ecological site. The similarity index during the baseline period ranged between 35-60%, responding to declines in saltgrass production on the site. However, in 2009 saltgrass frequency significantly increased, saltgrass cover reflected this change as well. In 2002-03 the site experienced a broad inkweed germination event, shown in the increase in seedling density in 2003 and subsequent survivors as juveniles. Since that period total inkweed density has increased. Utilization on the site is 11-20% above the 40% limit for riparian pastures.

Table 53. DELTA_07 Comparison to Moist Floodplain Ecological Site

Ecological Site: Moist Floodplain		**% Composition by Weight**				
Functional Group	**Species**	**Site Potential**	**2002**	**2003**	**2004**	**2007**
Annual Forbs	AAFF	Trace to 2%				
Perennial Forbs	PYRA	0-2%				
	NIOC2	0-2%				
	SUMO	0-2%	42% (2)	55% (2)	51% (2)	67% (2)
	HECU3	0-2%				
Other Perennial Forbs		0-2%				
Perennial Graminoids	DISP	40-60%	58%	45%	49%	33%
	SPAI	10-20%				
	LETR5	5-15%				
	JUBA	5-10%				
	CAREX	0-5%				
	POSE	0-5%				
	LECI	0-5%				
Other Perennial Graminoids		0-5%				
Shrubs	ATTO	0-3%				
	ERNA10	0-3%				
	ROWO	0-3%				
	SAEX	0-3%				
	SAVE4	0-3%				
Other Shrubs	SSSS	0-3%				
Trees	POFR2	2-5%				
	SALA3	2-5%				
Nonnative Species	NONA	0%				
Total Forbs		5-10%	42%	55 %	51%	70%
Total Perennial Graminoids		80%	58%	45%	49%	33%
Total Shrubs		5-15%	0%	0%	0%	0%
Total Trees		4-10%	0%	0%	0%	0%
Total Nonnative Species		0%	0%	0%	0%	0%
Similarity Index			60%	47%	51%	35%
() Values in parentheses are maximum allowable amount for species when calculating similarity index.						

Table 54. Utilization, Weighted Average, Delta_07

2007	2008	2009
60%	54%	51%

Table 55. Utilization by Species, Delta_07

	DISP
2007	60%
2008	54%
2009	51%

Table 56. Frequency (%), DELTA_07

Life Forms	Species	2002	2003	2004	2007	2009
Perennial Graminoid	DISP	114	93	116	102	121**
Shrubs	SUMO	32	16	15	12	15

** indicates a significant difference, α<0.1, **<0.05 compared to previous sampling period*

Table 57. Cover (%) Forbs, Graminoids, Sub-shrubs DELTA_07

Life Forms	Species	2002	2003	2004	2007	2009
Perennial Graminoid	DISP	26	17	8	11	25

Table 58. Cover (m) Shrubs DELTA_07

Species	2003	2004	2007	2009
SUMO	25.1	10.3	27.0	32.8

Table 59. Ground Cover (%) DELTA_07

Substrate	2002	2003	2004	2007	2009
Bare Soil	22	0	0	0	0
Dung	2	2	1	1	2
Litter	51	53	28	47	68
Rock	0	0	0	0	0
Standing Dead	0	0	6	12	10
Bare Ground	0	43	59	52	30

Table 60. Shrub Densities and Age Classes DELTA_07

	SUMO				
Age Class	**2002**	**2003**	**2004**	**2007**	**2009**
Seedling	0	422	0	1	5
Juvenile	7	112	7	48	32
Mature	17	37	27	40	46
Decadent	1	18	21	21	7
Total	25	589	55	110	90

Irrigated Pastures

The Lake Field is located west of U.S. Highway 395 north of Diaz Lake. This irrigated pasture was last evaluated in 2007 and received a score of 84%. This has been visited since 2007 and has shown improvement, however an official rating of the pasture will take place in 2011.

Table 61. Irrigated Pasture Condition Scores 2007-09

Pasture	Score/ 07	Score/ 08	Score/ 09
Lake Field	84	X	X

X indicates no evaluation made.

Stock Water Sites

There is one proposed stock water site for the Delta Lease located near the Lone Pine Visitor Center in the Bolin Field. Water was supposed to be supplied by the well at the Lone Pine Visitor Center. However, it was determined that there was not an adequate supply of water to support both uses. Another site to replace the old site is currently being evaluated. For the interim the lessee will receive stock water from a diversion that runs from the LAA for 2010.

Fencing

The Delta Lease has one fence; the Delta Riparian Exclosure located north of the Pumpback Station.

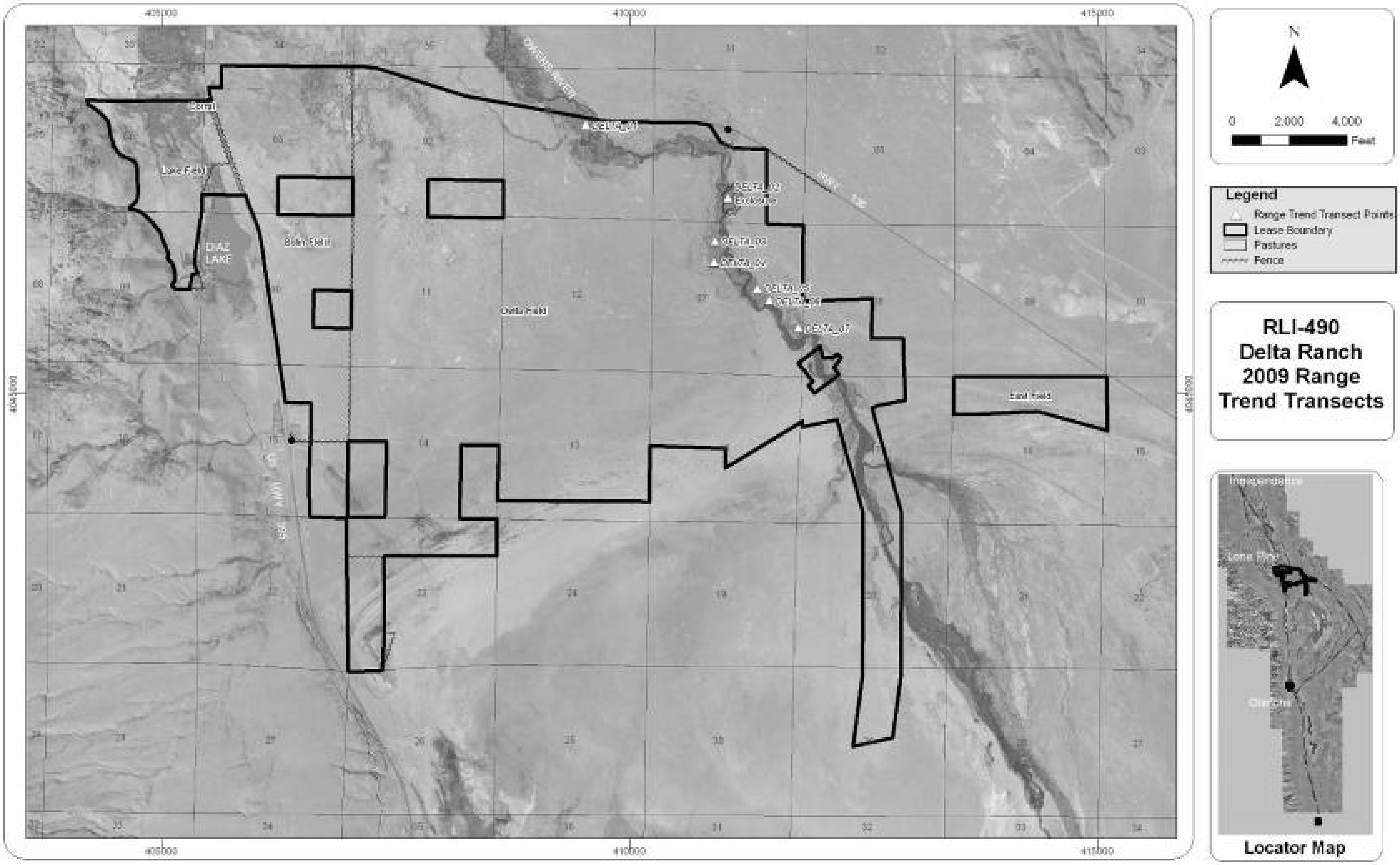
The Delta Riparian Exclosure has also been completed. Some modifications to the original plan were made to allow for better fence alignment while still encompassing several bends in the river for habitat observation. This riparian exclosure was constructed around an existing range trend transect and will serve as an ungrazed reference transect. All the fencing on the Delta Lease has been completed.

Salt and Supplement Sites

Cake blocks that contain trace minerals and protein are distributed for supplement on the lease. The blocks are dispersed randomly each time and if uneaten they biodegrade within one grazing season.

Burning

There were no controlled burns proposed on the lease in 2009.



Land Use Figure 7. Delta Lease RLI-490, Range Trend Transect

6.8. Land Management Appendices

6.8.1. Appendix 1. LOPR Range Trend Monitoring Species List.

LIFE FORM	SPECIES	SCIENTIFIC NAME	COMMON NAME
Forb	AMAL	*Amaranthus albus*	prostrate pigweed
	AMARA	*Amaranthus sp.*	pigweed
	ANCA10	*Anemopsis californica*	yerba mansa
	APCA	*Apocynum cannabinum*	dogbane
	ARLU	*Artemisia ludoviciana*	white sagebrush
	ASTRA	*Astragalus sp.*	mIlkvetch
	ATPH	*Atriplex phyllostegia*	leafcover saltweed
	ATRIP	*Atriplex sp.*	saltbush species
	ATSES	*Atriplex serenana var. serenana*	bractscale
	ATTR	*Atriplex truncata*	wedgescale saltbush
	BAHY	*Bassia hyssopifolia*	fivehorn smotherweed
	CALI4	*Castilleja lineriifolia*	Wyoming Indian paintbrush
	CAMIS	*Camissonia sp.*	suncup species
	CHBR	*Chorizanthe brevicornu*	brittle spineflower
	CHENO	*Chenopodium sp.*	goosefoot species
	CHHI	*Chenopodium hians*	hians goosefoot
	CHIN2	*Chenopodium incanum*	mealy goosefoot
	CHLE4	*Chenopodium leptophyllum*	narrowleaf goosefoot
	CHST	*Chaenactis stevioides*	Steve's duskymaiden
	CIMO	*Cirsium mohavense*	Mojave thistle
	CLEOM2	*Cleomella sp.*	stinkweed species
	CLOB	*Cleomella obtusifolia*	bluntleaf stinkweed
	CLPA4	*Cleomella parviflora*	slender cleomella
	COMAC	*Cordylanthus maritimus var. canescens*	alkali bird's beak
	CORA5	*Cordylanthus ramosus*	bushy bird's beak
	CRCI2	*Cryptantha circumscissa*	cushion cryptantha
	CRTR5	*Cressa truxillensis*	spreading alkaliweed
	CRYPT	*Cryptantha*	cryptantha
	CUSCU	*Cuscuta sp.*	dodder species
	DESO2	*Descurainia sophia*	herb sophia
	ERAM2	*Eriogonum ampullaceum*	Mono buckwheat
	ERIAS	*Eriastrum sp.*	woollystar species
	ERIOG	*Eriogonum sp*	buckwheat
	ERMA2	*Eriogonum maculatum*	spotted buckwheat
	ERPR4	*Eriophyllum pringlei*	Pringle's wooly sunflower
	ERSP3	*Eriastrum sparsiflorum*	Great Basin woollystar
	ERWI	*Eriastrum wilcoxii*	Wilcox's woolystar
	FRSA	*Frankenia salina*	alkali seaheath
	GILIA	*Gilia sp.*	gilia species
	GITR	*Gilia transmontana*	transmontane gilia
	GLLE3	*Glycyrrhiza lepidota*	American licorice
	GRIND	*Grindelia sp.*	gumweed species
	HEAN3	*Helianthus annuus*	common sunflower
	HECU3	*Heliotropium curassavicum*	salt heliotrope
	LACO13	*Laennecia coulteri*	conyza

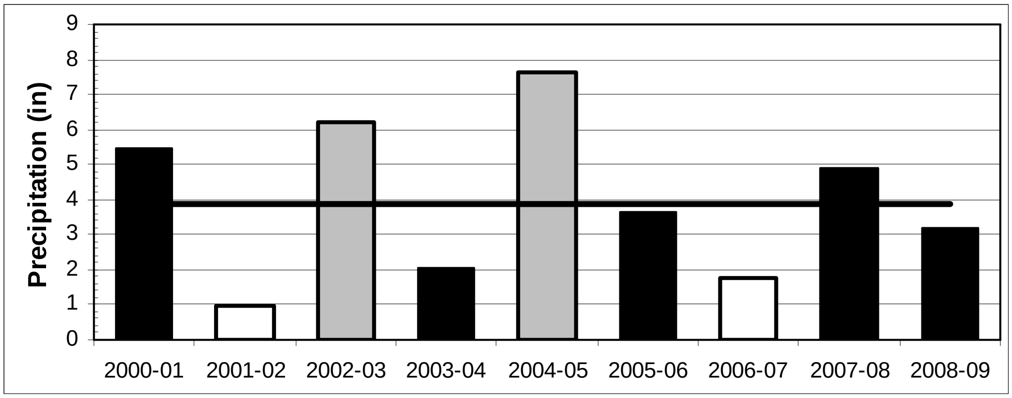
LIFE FORM	SPECIES	SCIENTIFIC NAME	COMMON NAME
Forb	LASE	*Lactuca serriola*	prickly lettuce
	LEFL2	*Lepidium flavum*	yellow pepperweed
	LOCO6	*Lotus corniculatus*	birdsfoot deervetch
	MACA2	*Machaeranthera canescens*	hoary tansyaster
	MACA2	*Machaeranthera leptophylla*	hoary tansyaster
	MALAC3	*Malacothrix*	desert dandelion
	MALE3	*Malvella leprosa*	alkali-mallow
	MEAL6	*Mentzelia albicaulis*	little blazing star
	MENTZ	*Mentzelia sp.*	blazingstar species
	MEOF	*Melilotus officinalis*	white sweetclover
	MEOF	*Melilotus officinalis*	yellow sweetclover
	NADE	*Nama demissum*	purplemat
	NIOC2	*Nitrophila occidentalis*	boraxweed
	OENOT	*Oenothera*	evening primrose
	PHFR2	*Phacelia fremontii*	Fremont's phacelia
	POAR11	*Polygonum aviculare var. arenastrum*	common knotweet
	PSATH	*Psathyrotes ramosissima*	velvet turtleback
	PSRA	*Psathyrotes ramosissima*	velvet turtleback
	PYRA	*Pyrrocoma racemosa*	clustered goldenweed
	SATR12	*Salsola tragus*	tumbleweed
	SEVE2	*Sesuvium verrucosum*	verrucose seapurslane
	SICO2	*Sidalcea covillei*	Owens Valley sidalcea
	SMST	*Smilacina stellata*	starry false lily of the valley
	STEPH	*Stephanomeria sp.*	wirelettuce species
	STEX	*Stephanomeria exigua*	small wirelettuce
	STPA4	*Stephanomeria pauciflora*	brownplume wirelettuce
	STPI	*Stanleya pinnata*	desert princesplume
	SUMO	*Suaeda moquinii*	inkweed
	TRFR2	*Trifolium fragiferum*	strawberry clover
	XAST	*Xanthium strumarium*	rough cockleburr
	2FORB	*herbaceous forb sp.*	unidentified forb
Graminoid	AGEL3	*Agropyron elongatum*	tall wheatgrass
	ARPU9	*Aristida purpurea*	purple threeawn
	BRRU2	*Bromus rubens*	red brome
	BRTE	*Bromus tectorum*	cheatgrass
	CADO2	*Carex douglasii*	Douglas' sedge
	CAPR5	*Carex praegracilis*	clustered field sedge
	CAREX	*Carex sp.*	sedge species
	CYDA	*Cynodon dactylon*	bermuda grass
	DISP	*Distichlis spicata*	saltgrass
	ELEL5	*Elymus elymoides*	bottlebrush squirreltail
	ELEOC	*Eleocharis sp.*	spikerush species
	FESTU	*Festuca sp.*	fescue species
	HOJU	*Hordeum jubatum*	foxtail barley
	JUBA	*Juncus balticus*	baltic rush
	LECI4	*Leymus cinereus*	basin wildrye

LIFE FORM	SPECIES	SCIENTIFIC NAME	COMMON NAME
Graminoid	LETR5	*Leymus triticoides*	beardless wildrye
	LOLIU	*Lolium sp.*	ryegrass species
	MUAS	*Muhlenbergia asperifolia*	alkali muhly
	PADI6	*Paspalum distichum*	knotgrass
	POA	*Poa sp.*	bluegrass species
	POMO5	*Polypogon monspeliensis*	annual rabbitsfoot grass
	POSE	*Poa secunda*	sandberg bluegrass
	SCAM6	*Schoenoplectus americanus*	chairmaker's bulrush
	SCAR	*Schismus arabicus*	Arabian schismus
	SCPH	*Schedonorus phoenix*	reed fescue
	SCPH	*Schedonorus phoenix*	tall fescue
	SPAI	*Sporobolus airoides*	alkali sacaton
	SPGR	*Spartina gracilis*	alkali cordgrass
	STIPA	*Stipa sp.*	needlegrass species
	THPO7	*Thinopyrum ponticum*	rush wheatgrass
	TYLA	*Typha latifolia*	broadleaf cattail
	2GRAM	*graminoid sp.*	unidentified graminoid
Shrub	ALOC2	*Allenrolfea occidentalis*	iodinebush
	ARTR2	*Artemisia tridentata*	big sagebrush
	ATCA	*Atriplex canescens*	fourwing saltbush
	ATCO	*Atriplex confertifolia*	shadscale
	ATPA3	*Atriplex parryi*	Parry's saltbush
	ATPO	*Atriplex polycarpa*	cattle saltbush
	ATRIP	*Atriplex sp.*	saltbush species
	ATTO	*Atriplex torreyi*	Nevada saltbush
	EPNE	*Ephedra nevadensis*	Nevada jointfir
	EPVI	*Ephedra viridis*	green mormon-tea
	ERNA10	*Ericameria nauseosus*	rubber rabbitbrush
	FOPU2	*Forestiera pubescens*	desert olive
	GUSA2	*Gutierrezia sarothrae*	broom snakeweed
	HYSA	*Hymenoclea salsola*	burrobrush
	LEFR2	*Lepidium fremontii*	desert lepidium
	MACA2	*Machaeranthera canescens*	hoary tansyaster
	MACA17	*Machaeranthera carnosa*	shrubby alkali aster
	PSAR4	*Psorothamnus aborescens*	Mojave indigobush
	ROWO	*Rosa woodsii*	Woods' Rose
	SAEX	*Salix exigua*	coyote willow
	SALIX	*Salix sp.*	willow species
	SAVE4	*Sarcobatus vermiculatus*	greasewood
	STEPH	*Stephanomeria sp.*	wirelettuce species
	SUMO	*Suaeda moquinii*	inkweed
	TARA	*Tamarisk ramosissima*	tamarisk

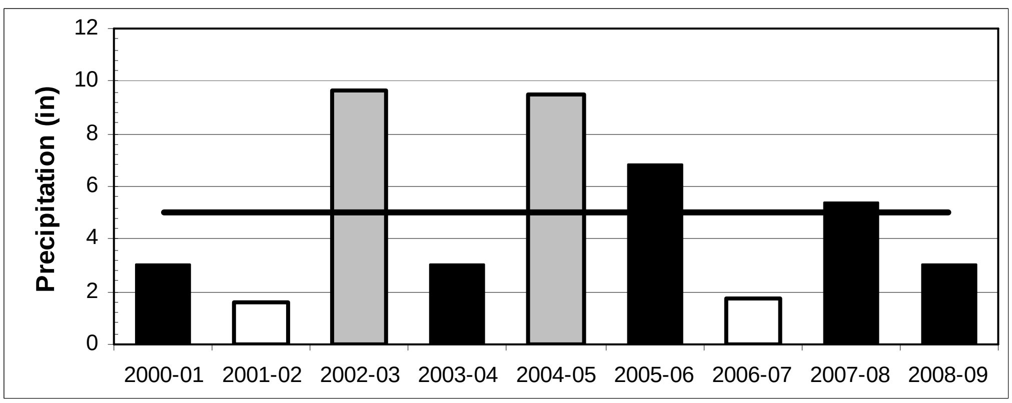
6.8.2. Appendix 2.

Figure 2. Annual precipitation (October through September) at the following locations: Lone Pine (a), Independence (b), and Intake (c). Black indicates precipitations falling within 50% of a historical value. Gray indicates precipitations 50% greater than a historical value. White indicates precipitations 50% less than a historical value. Black lines are mean values.

a) Lone Pine



b) Independence



c) Intake

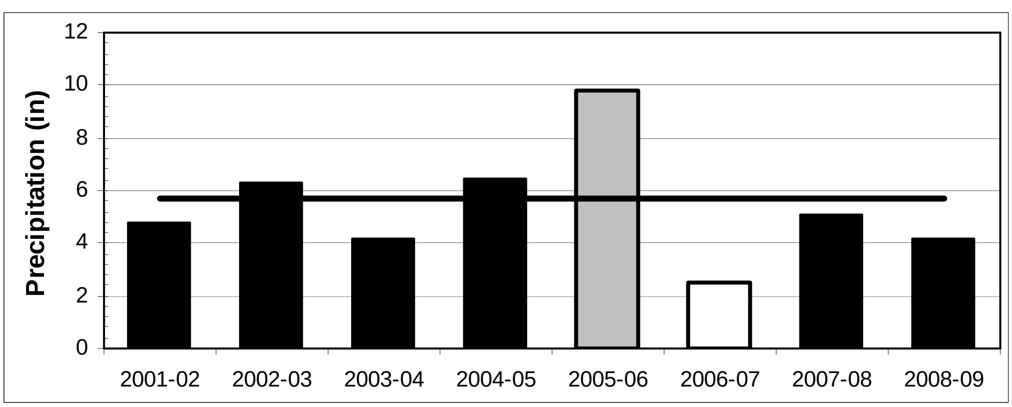
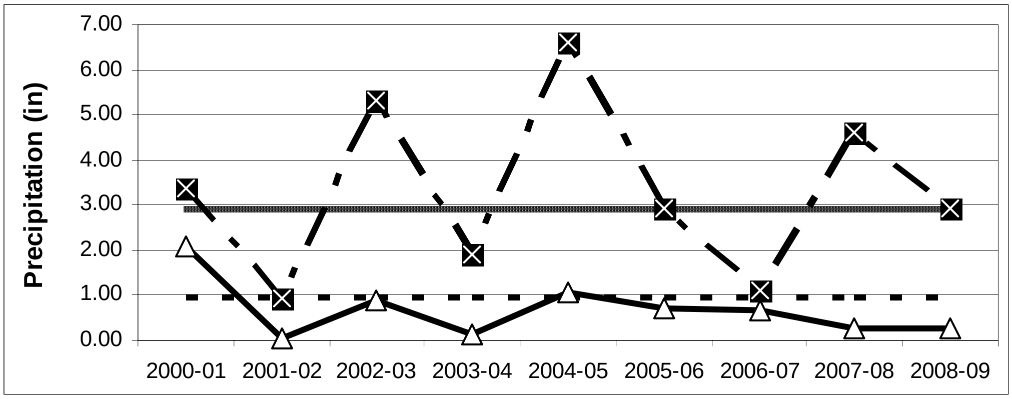
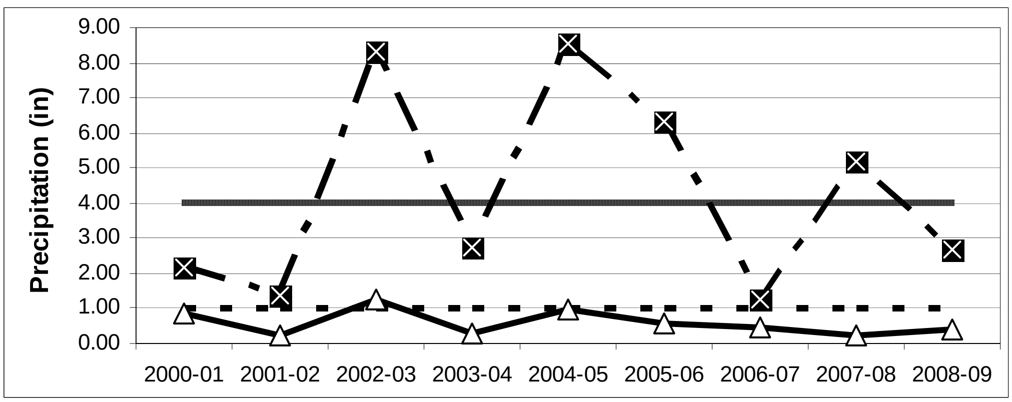


Figure 3. Mean precipitations for cold and warm seasons at the following locations: Lone Pine (a), Independence (b), and Intake (c).

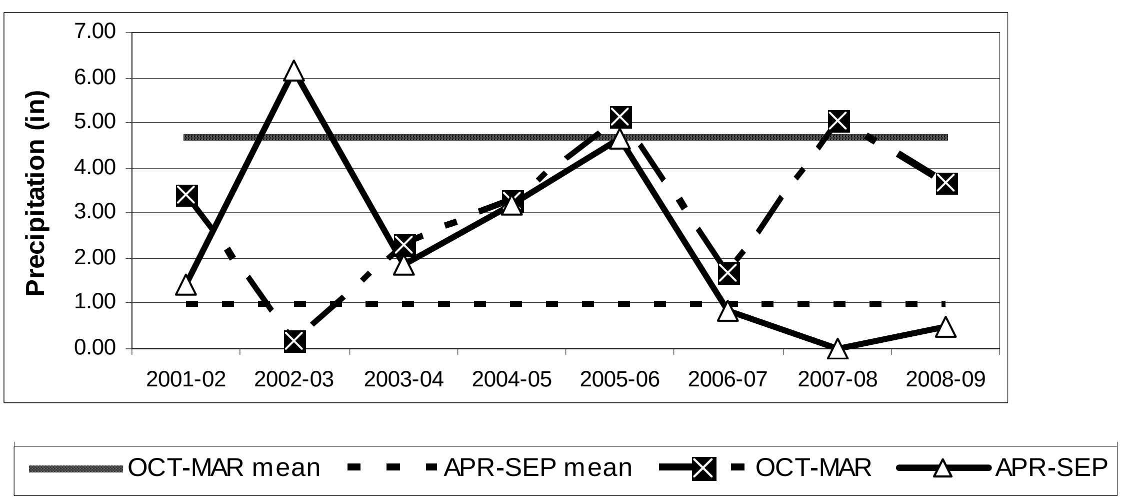
a) Lone Pine



b) Independence



c) Intake



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National Resource Conservation Service (NRCS). 1995. *NRCS Technical Guide, Section II*, 029XG007 CA Saline Bottom.

National Resource Conservation Service (NRCS). 1995. *NRCS Technical Guide, Section II*, 029XG002CA Saline Meadow.

National Resource Conservation Service (NRCS). 1995. *NRCS Technical Guide, Section II*, 029XG020CA Moist Floodplain.

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6.8.4. Appendix 3. Transect Photos

APPENDIX 3 – SECTION 1

LOWER OWENS RIVER PROJECT

Range Trend Monitoring Site Photos

Intake Lease (RLI-475)

2009

Transect	Pasture	Ecological Site	Sampling Date
STEWART_01	Intake Field	Moist Floodplain	August 6, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

APPENDIX 3 – SECTION 2

LOWER OWENS RIVER PROJECT

Range Trend Monitoring Site Photos

Twin Lakes (RLI-491)

2002-2009

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_37	Lower Blackrock Field	Saline Bottom	August 20, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_37	Lower Blackrock Field	Saline Bottom	June 3, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	**Pasture**	**Ecological Site**	**Sampling Date**
BLKROC_37	Lower Blackrock Field	Saline Bottom	July 23, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_37	Lower Blackrock Field	Saline Bottom	July 25, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_37	Lower Blackrock Field	Saline Bottom	August 4, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
INTAKE_01	Upper Blackrock Field	Saline Meadow	September 3, 2002

0 – 100 meters

100 - 0 meters

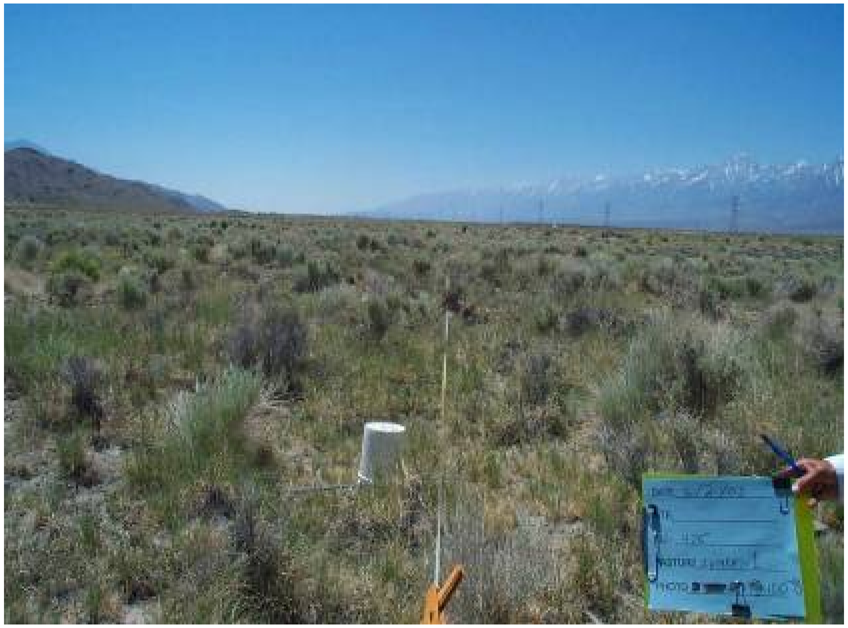
0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
INTAKE_01	Upper Blackrock Field	Saline Meadow	June 2, 2003

Photo Not Available



0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
INTAKE_01	Upper Blackrock Field	Saline Meadow	May 24, 2004

0 – 100 meters

100 - 0 meter

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
INTAKE_01	Upper Blackrock Field	Saline Meadow	August 2, 2007

0 – 100 meters

100 - 0 meter

0 meters

51 meters

99 meters

Transect	**Pasture**	**Ecological Site**	**Sampling Date**
INTAKE_01	Upper Blackrock Field	Saline Meadow	August 5, 2009

0 – 100 meters

100 - 0 meter

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
TWINLAKES_02	Lower Blackrock Field	Saline Bottom Wetland	August 31, 2002

0 – 100 meters

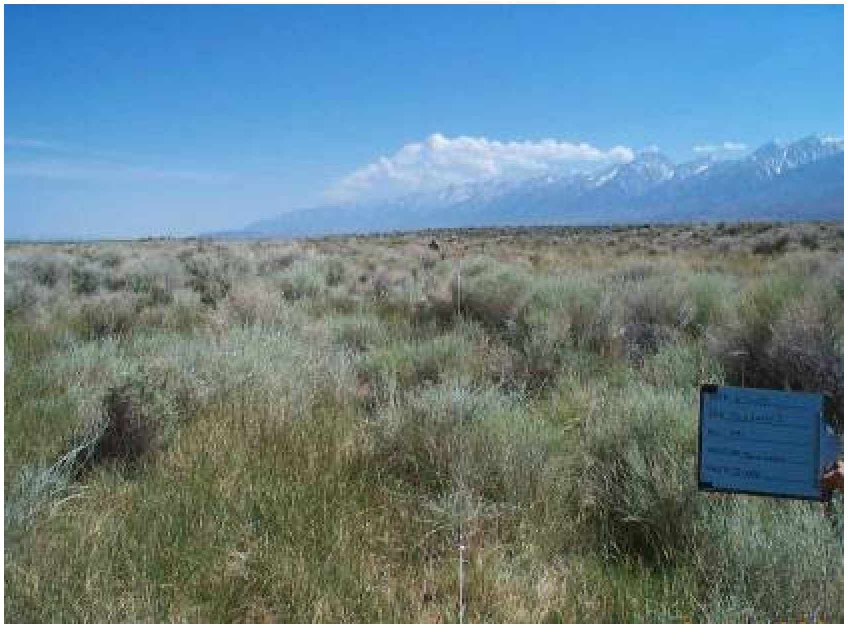
100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
TWINLAKES_02	Lower Blackrock Field	Saline Bottom Wetland	June 1, 2003



0 – 100 meters

100 - 0 meter

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
TWINLAKES_02	Lower Blackrock Field	Saline Bottom Wetland	June 29, 2004

0 – 100 meters

100 - 0 meter

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
TWINLAKES_02	Lower Blackrock Field	Saline Bottom Wetland	July 25, 2007

0 – 100 meters

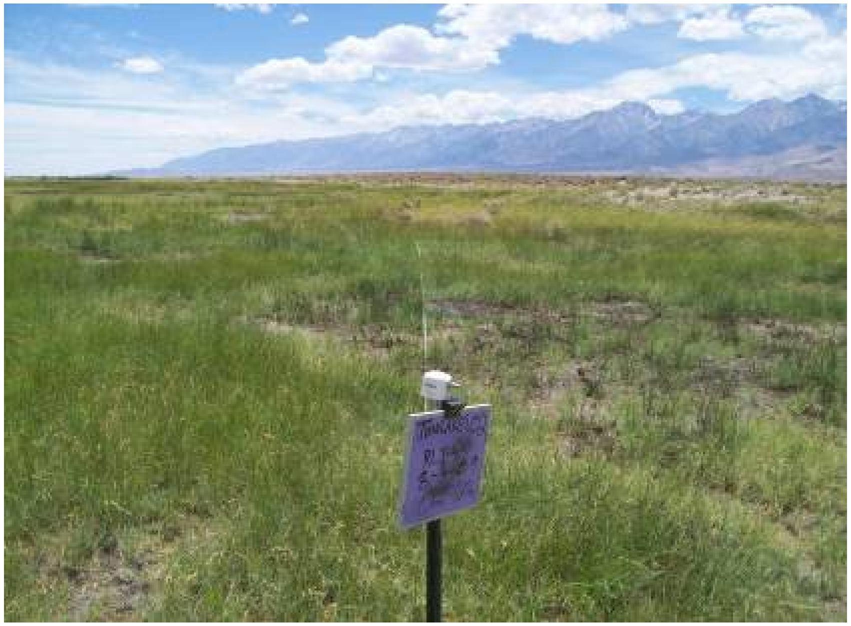
100 - 0 meters

0 meters

51meters

99meters

Transect	Pasture	Ecological Site	Sampling Date
TWINLAKES_02	Lower Blackrock Field	Saline Bottom Wetland	August 4, 2009



0 – 100 meters

100 - 0 meters

0 meters

51meters

99meters

Transect	Pasture	Ecological Site	Sampling Date
TWINLAKES_03	Lower Blackrock Riparian Field	Moist Floodplain	August 31, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
TWINLAKES_03	Lower Blackrock Riparian Field	Moist Floodplain	June 1, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

Photo Not Available

99 meters

Transect	Pasture	Ecological Site	Sampling Date
TWINLAKES_03	Lower Blackrock Riparian Field	Moist Floodplain	May 24, 2004

0 – 100 meters

Photo Not Available

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
TWINLAKES_03	Lower Blackrock Riparian Field	Moist Floodplain	July 25, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
TWINLAKES_03	Lower Blackrock Riparian Field	Moist Floodplain	August 27, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
TWINLAKES_04	Lower Blackrock Riparian Field	Moist Floodplain	August 30, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
TWINLAKES_04	Lower Blackrock Riparian Field	Moist Floodplain	June 4, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
TWINLAKES_04	Lower Blackrock Riparian Field	Moist Floodplain	May 25, 2004

Photo Not Available

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
TWINLAKES_04	Lower Blackrock Riparian Field	Moist Floodplain	July 9, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
TWINLAKES_04	Lower Blackrock Riparian Field	Moist Floodplain	August 5, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
TWINLAKES_05	Lower Blackrock Field	Saline Meadow	September 3, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
TWINLAKES_05	Lower Blackrock Field	Saline Meadow	June 4, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
TWINLAKES_05	Lower Blackrock Field	Saline Meadow	July 9, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
TWINLAKES_05	Lower Blackrock Field	Saline Meadow	August 6, 2007

0 – 100 meters

Photo Not Available

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
TWINLAKES_05	Lower Blackrock Field	Saline Meadow	

Transect submerged. Not run in 2009.

Transect	**Pasture**	**Ecological Site**	**Sampling Date**
TWINLAKES_06	Lower Blackrock Riparian Field	Moist Floodplain	July 11, 2006

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
TWINLAKES_06	Lower Blackrock Riparian Field	Moist Floodplain	August 6, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
TWINLAKES_06	Lower Blackrock Riparian Field	Moist Floodplain	August 5, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

APPENDIX 3 – SECTION 3

LOWER OWENS RIVER PROJECT

Range Trend Monitoring Site Photos

Blackrock Lease (RLI-428)

2002 – 2009

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_01	White Meadow Field	Saline Bottom	August 30, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_01	White Meadow Field	Saline Bottom	June 4, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_01	White Meadow Field	Saline Bottom	July 9, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_01	White Meadow Field	Saline Bottom	July 30, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_01	White Meadow Field	Saline Bottom	August 4, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_02	Reservation Field	Saline Meadow	August 30, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_02	Reservation Field	Saline Meadow	June 5, 2003

0 – 100 meters

Photo not available

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_02	Reservation Field	Saline Meadow	July 12, 2004

0 – 100 meters

100 - 0 meter

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_02	Reservation Field	Saline Meadow	July 30, 2007

0 – 100 meters

100 - 0 meter

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_02	Reservation Field	Saline Meadow	July 29, 2009

0 – 100 meters

100 - 0 meter

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_03	Reservation Field	Saline Meadow	August 29, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_03	Reservation Field	Saline Meadow	June 09, 2003

0 – 100 meters

100 - 0 meter

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_03	Reservation Field	Saline Meadow	June 30, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_03	Reservation Field	Saline Meadow	July 30, 2007

0 – 100 meters

100 - 0 meters

0 meters

51meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_03	Reservation Field	Saline Meadow	July 30, 2009

0 – 100 meters

100 - 0 meters

0 meters

51meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_04	Robinson Field	Saline Meadow	August 29, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_04	Robinson Field	Saline Meadow	June 9, 2003

Photo Not Available

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_04	Robinson Field	Saline Meadow	June 21, 2004

0 – 100 meters

100 - 0 meters

Photo Not Available

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_04	Robinson Field	Saline Meadow	July 27, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_04	Robinson Field	Saline Meadow	July 29, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transcect	Pasture	Ecological Site	Sampling Date
BLKROC_05	Russel Field	Saline Meadow	August 29, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_05	Russel Field	Saline Meadow	June 12, 2003

0 – 100 meters

100 - 0 meter

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_05	Russel Field	Saline Meadow	June 22, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_05	Russel Field	Saline Meadow	July 31, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_05	Russel Field	Saline Meadow	July 29, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_06	Locust Field	Saline Meadow	August 29, 2002

0 – 100 meters

100 - 0 meters

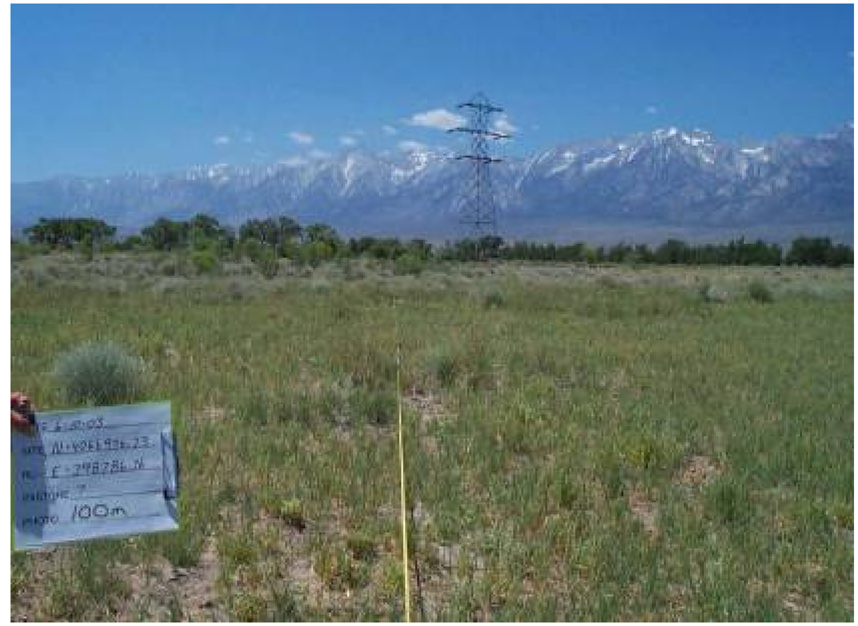
0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_06	Locust Field	Saline Meadow	June 10, 2003

0 – 100 meters



100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_06	Locust Field	Saline Meadow	June 22, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_06	Locust Field	Saline Meadow	July 27, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_06	Locust Field	Saline Meadow	July 29, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transcect	Pasture	Ecological Site	Sampling Date
BLKROC_07	Wrinkle Field	Saline Meadow	August 28, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_07	Wrinkle Field	Saline Meadow	June 10, 2003

0 – 100 meters

Photo Not Available

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC 07	Wrinkle Field	Saline Meadow	June 22, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_07	Wrinkle Field	Saline Meadow	July 27, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_07	Wrinkle Field	Saline Meadow	July 29, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_08	Springer Field	Saline Meadow	August 28, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_08	Springer Field	Saline Meadow	June 10, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_08	Springer Field	Saline Meadow	June 23, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_08	Springer Field	Saline Meadow	August 06, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect BLKROC_08 discontinued in 2009

Site not representative of saline meadow due to influence of adjacent ditch

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_09	Horse Holding	Sodic Fan	August 27, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_09	Horse Holding	Sodic Fan	June 12, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_09	Horse Holding	Sodic Fan	July 31, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_09	Horse Holding	Sodic Fan	July 28, 2009

Photo Not Available

0 – 100 meters

100 - 0 meters

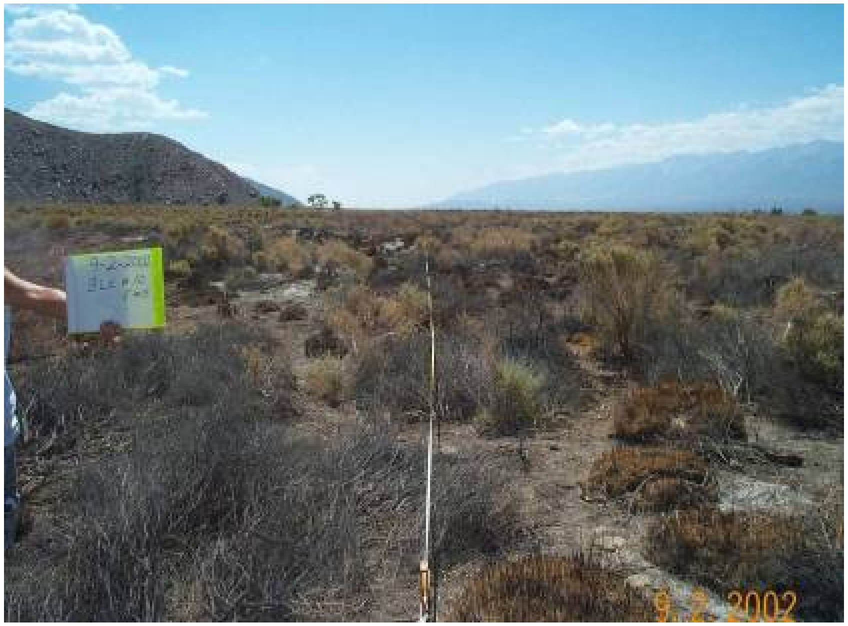
0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_10	White Meadow Riparian Field	Moist Floodplain	September 2, 2002

0 – 100 meters



100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_10	White Meadow Riparian Field	Moist Floodplain	June 4, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_10	White Meadow Riparian Field	Moist Floodplain	May 25, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_10	White Meadow Riparian Field	Moist Floodplain	August 4, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_11	White Meadow Riparian Field	Moist Floodplain	September 2, 2002

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_11	White Meadow Riparian Field	Moist Floodplain	June 5, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_11	White Meadow Riparian Field	Moist Floodplain	May 26, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_11	White Meadow Riparian Field	Moist Floodplain	July 10, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_11	White Meadow Riparian Field	Moist Floodplain	August 4, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_12	North Riparian Field	Moist Floodplain	September 3, 2002

0 – 100 meters

100 - 0 meters

0 meters

51 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_12	North Riparian Field	Moist Floodplain	August 26, 2003

0 – 100 meters

100 - 0 meters

0 meters

Photo not available

51 meters

Photo not available

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_12	North Riparian Field	Moist Floodplain	July 13, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

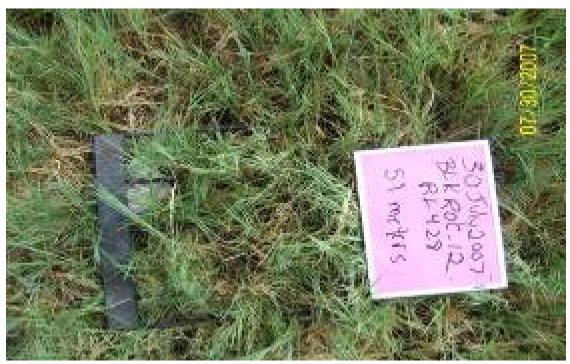
99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_12	North Riparian Field	Moist Floodplain	July 30, 2007

0 – 100 meters

100 - 0 meters

0 meters



51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_12	North Riparian Field	Moist Floodplain	July 30, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_13	South Riparian Field	Moist Floodplain	September 3, 2002

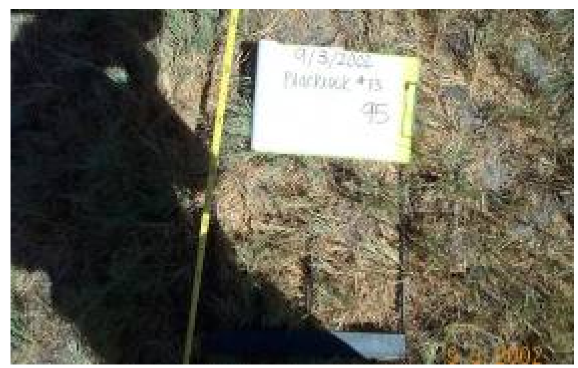
0 – 100 meters

100 - 0 meters

0 meters

Photo not Available

51 meters



95 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_13	South Riparian Field	Moist Floodplain	June 9, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_13	South Riparian Field	Moist Floodplain	June 1, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_13	South Riparian Field	Moist Floodplain	July 12, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_13	South Riparian Field	Moist Floodplain	July 30, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_14	White Meadow Riparian Field	Moist Floodplain	August 24, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_14	White Meadow Riparian Field	Moist Floodplain	June 5, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_14	White Meadow Riparian Field	Moist Floodplain	May 26, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_14	White Meadow Riparian Field	Moist Floodplain	July 11, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	**Pasture**	**Ecological Site**	**Sampling Date**
BLKROC_14	White Meadow Riparian Field	Moist Floodplain	August 4, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_15	Reservation Riparian Field	Moist Floodplain	June 20, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_15	Reservation Riparian Field	Moist Floodplain	June 1, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_15	Reservation Riparian Field	Moist Floodplain	May 24, 2005

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_15	Reservation Riparian Field	Moist Floodplain	July 11, 2007

0 – 100 meters

100 - 0 meter

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_15	Reservation Riparian Field	Moist Floodplain	July 31, 2009

0 – 100 meters

100 - 0 meter

0 meters

Photo not Available

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_16	Reservation Riparian Field	Moist Floodplain	June 20, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_16	Reservation Riparian Field	Moist Floodplain	June 1, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_16	Reservation Riparian Field	Moist Floodplain	May 25, 2005

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_16	Reservation Riparian Field	Moist Floodplain	July 31, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_16	Reservation Riparian Field	Moist Floodplain	July 30, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_17	Reservation Riparian Field	Moist Floodplain	June 20, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_17	Reservation Riparian Field	Moist Floodplain	May 27, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_17	Reservation Riparian Field	Moist Floodplain	May 25, 2005

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_17	Reservation Riparian Field	Moist Floodplain	July 31, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_17	Reservation Riparian Field	Moist Floodplain	July 30, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_18	Wrinkle Riparian Field	Moist Floodplain	June 23, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_18	Wrinkle Riparian Field	Moist Floodplain	June 2, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transcect	Pasture	Ecological Site	Sampling Date
BLKROC_18	Wrinkle Riparian Field	Moist Floodplain	May 25, 2005

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_18	Wrinkle Riparian Field	Moist Floodplain	July 12, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_18	Wrinkle Riparian Field	Moist Floodplain	July 30, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_19	Wrinkle Riparian Field	Moist Floodplain	June 23, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_19	Wrinkle Riparian Field	Moist Floodplain	June 2, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_19	Wrinkle Riparian Field	Moist Floodplain	May 31, 2005

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_19	Wrinkle Riparian Field	Moist Floodplain	July 13, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_19	Wrinkle Riparian Field	Moist Floodplain	July 29, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_20	Wrinkle Riparian Field	Moist Floodplain	June 20, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_20	Wrinkle Riparian Field	Moist Floodplain	June 2, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_20	Wrinkle Riparian Field	Moist Floodplain	July 13, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_20	Wrinkle Riparian Field	Moist Floodplain	July 29, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_21	Wrinkle Riparian Field	Moist Floodplain	June 2, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_21	Wrinkle Riparian Field	Moist Floodplain	May 31, 2005

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_21	Wrinkle Riparian Field	Moist Floodplain	July 13, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_21	Wrinkle Riparian Field	Moist Floodplain	July 29, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_22	North Riparian Field	Moist Floodplain	July 11, 2006

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_22	North Riparian Field	Moist Floodplain	July 18, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_22	North Riparian Field	Moist Floodplain	July 30, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_23	South Riparian Field	Moist Floodplain	July 12, 2006

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_23	South Riparian Field	Moist Floodplain	July 30, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_39	White Meadow Field	Saline Meadow	August 20, 2002

0 – 100 meters

100 - 0 meters

0 meters

51 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_39	White Meadow Field	Saline Meadow	June 24, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_39	White Meadow Field	Saline Meadow	July 12, 2004

0 – 100 meters

100 - 0 meters

Photo not available

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_39	White Meadow Field	Saline Bottom	August 4, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_44	Reservation Field	Saline Meadow	August 20, 2002

0 – 100 meters

100 - 0 meters

0 meters

51 meters

95 meters

Transect	**Pasture**	**Ecological Site**	**Sampling Date**
BLKROC_44	Reservation Field	Saline Meadow	June 24, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_44	Reservation Field	Saline Meadow	July 12, 2004

Photo not available

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_44	Reservation Field	Saline Meadow	August 10, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_44	Reservation Field	Saline Meadow	July 29, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_49	Reservation Field	Sandy Terrace	August 20, 2002

0 – 100 meters

100 - 0 meters

Photo not available

0 meters

51 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_49	Reservation Field	Sandy Terrace	June 3, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_49	Reservation Field	Sandy Terrace	July 12, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_49	Reservation Field	Sandy Terrace	July 18, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_49	Reservation Field	Sandy Terrace	July 29, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_51	Reservation Field	Sodic Fan	August 20, 2002

0 – 100 meters

100 - 0 meters

0 meters

51 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_51	Reservation Field	Sodic Fan	June 3, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_51	Reservation Field	Sodic Fan	July 13, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_51	Reservation Field	Sodic Fan	July 12, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
BLKROC_51	Reservation Field	Sodic Fan	July 30, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

APPENDIX 3 – SECTION 4

LOWER OWENS RIVER PROJECT

Range Trend Monitoring Site Photos

Thibaut Lease (RLI–430)

2002 – 2009

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_01	Waterfowl Management Area	Saline Meadow	August 26, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	**Pasture**	**Ecological Site**	**Sampling Date**
THIBAUT_01	Waterfowl Management Area	Saline Meadow	June 11, 2003

0 – 100 meters

100 - 0 meters

Photo not available

0 meters

Photo not available

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_01	Waterfowl Management Area	Saline Meadow	June 16, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect rotated in 2008 and renamed THIBAUT_1A.
The previous end point was retained as the new start point.

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_01A	Waterfowl Management Area	Saline Meadow	August 9, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_01A	Waterfowl Management Area	Saline Meadow	August 5, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

Photo not available

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_02	Rare Plant Management Area	Saline Meadow	August 26, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	**Pasture**	**Ecological Site**	**Sampling Date**
THIBAUT_02	Rare Plant Management Area	Saline Meadow	June 11, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_02	Rare Plant Management Area	Saline Meadow	July 14, 2004

0 – 100 meters

100 - 0 meter

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_02	Rare Plant Management Area	Saline Meadow	August 9, 2007

0 – 100 meters

100 - 0 meter

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_02	Rare Plant Management Area	Saline Meadow	August 5, 2009

0 – 100 meters

100 - 0 meter

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_03	Thibaut Field	Saline Meadow	August 26, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_03	Thibaut Field	Saline Meadow	June 11, 2003

0 – 100 meters

100 - 0 meter

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_03	Thibaut Field	Saline Meadow	June 21, 2004

0 – 100 meters

100 - 0 meter

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_03	Thibaut Field	Saline Meadow	August 21, 2007

0 – 100 meters

100 - 0 meters

0 meters

51meters

99meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_03	Thibaut Field	Saline Meadow	August 5, 2009

0 – 100 meters

100 - 0 meters

0 meters

51meters

99meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_04	Thibaut Riparian Exclosure	Moist Floodplain	August 24, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

Photo not available

95 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_04	Thibaut Riparian Exclosure	Moist Floodplain	June 5, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_04	Thibaut Riparian Exclosure	Moist Floodplain	May 27, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_04	Thibaut Riparian Exclosure	Moist Floodplain	August 10, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_04	Thibaut Riparian Exclosure	Moist Floodplain	August 3, 2009

Photo not available

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_05	Thibaut Riparian Exclosure	Moist Floodplain	June 23, 2003

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_05	Thibaut Riparian Exclosure	Moist Floodplain	May 27, 2004

0 – 100 meters

100 - 0 meter

0 meters

51 meters

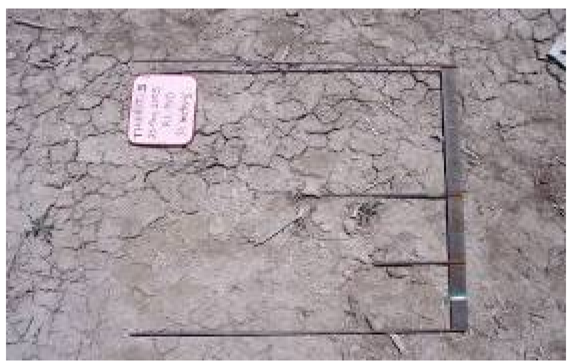
99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_05	Thibaut Riparian Exclosure	Moist Floodplain	May 23, 2005

0 – 100 meters

100 - 0 meters

0 meters



51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_05	Thibaut Riparian Exclosure	Moist Floodplain	August 6, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_05	Thibaut Riparian Exclosure	Moist Floodplain	August 3, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_06	Thibaut Riparian Exclosure	Moist Floodplain	June 23, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_06	Thibaut Riparian Exclosure	Moist Floodplain	May 26, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_06	Thibaut Riparian Exclosure	Moist Floodplain	May 23, 2005

0 – 100 meters

100 - 0 m

0 meters

51 meters

99 meters

Transcect	Pasture	Ecological Site	Sampling Date
THIBAUT_06	Thibaut Riparian Exclosure	Moist Floodplain	July 11, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_06	Thibaut Riparian Exclosure	Moist Floodplain	August 3, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_07	Thibaut Riparian Exclosure	Moist Floodplain	June 23, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transcect	Pasture	Ecological Site	Sampling Date
THIBAUT_07	Thibaut Riparian Exclosure	Moist Floodplain	May 26, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_07	Thibaut Riparian Exclosure	Moist Floodplain	May 23, 2005

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_07	Thibaut Riparian Exclosure	Moist Floodplain	July 11, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_07	Thibaut Riparian Exclosure	Moist Floodplain	August 3, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_08	Thibaut Field	Saline Bottom	August 21, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_08	Thibaut Field	Saline Botom	July 30, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	**Pasture**	**Ecological Site**	**Sampling Date**
THIBAUT_09	Thibaut Field	Saline Bottom	August 21, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
THIBAUT_09	Thibaut Field	Saline Bottom	July 30, 2009

Photo not available

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

APPENDIX 3 – SECTION 5

LOWER OWENS RIVER PROJECT

Range Trend Monitoring Site Photos

Islands Lease (RLI-489)

2002 – 2009

Transect	Pasture	Ecological Site	Sampling Date
ISLAND_06	Carasco Riparian Field South	Saline Meadow	August 27, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
ISLAND_06	Carasco Riparian Field South	Saline Meadow	June 13, 2003

0 – 100 meters

100 - 0 meter

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
ISLAND_06	Carasco Riparian Field South	Saline Meadow	June 14, 2004

0 – 100 meters

Photo not available

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
ISLAND_06	Carasco Riparian Field South	Saline Meadow	August 25, 2008

Photo not available

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
ISLAND_06	Carasco Riparian Field South	Saline Meadow	August 1, 2007

0 – 100 meters

Photo not available

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
ISLAND_06	Carasco Riparian Field South	Saline Meadow	July 27, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transcect	Pasture	Ecological Site	Sampling Date
ISLAND_07	River Field	Moist Floodplain	August 29, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
ISLAND_07	River Field	Moist Floodplain	June 13, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
ISLAND_07	River Field	Moist Floodplain	June 15, 2004

0 – 100 meters

100 - 0 m

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
ISLAND_07	River Field	Moist Floodplain	August 3, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transcect	Pasture	Ecological Site	Sampling Date
ISLAND_07	River Field	Moist Floodplain	August 26, 2008

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	**Pasture**	**Ecological Site**	**Sampling Date**
ISLAND_07	River Field	Moist Floodplain	July 28, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	**Pasture**	**Ecological Site**	**Sampling Date**
ISLAND_08	Depot Riparian Field	Moist Floodplain	August 28, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
ISLAND_08	Depot Riparian Field	Moist Floodplain	June 16, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
ISLAND_08	Depot Riparian Field	Moist Floodplain	July 26, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
ISLAND_08	River Field	Moist Floodplain	August 27, 2008

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
ISLAND_08	River Field	Moist Floodplain	July 27, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
ISLAND_09	Depot Riparian Field	Moist Floodplain	July 12, 2006

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
ISLAND_09	Depot Riparian Field	Moist Floodplain	July 31, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
ISLAND_09	River Field	Moist Floodplain	August 27, 2008

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
ISLAND_09	River Field	Moist Floodplain	July 24, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
ISLAND_10	River Field	Moist Floodplain	July 13, 2006

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
ISLAND_10	River Field	Moist Floodplain	July 26, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
ISLAND_10	River Field	Moist Floodplain	July 27, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
ISLAND_11	River Field	Moist Floodplain	July 13, 2006

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
ISLAND_11	River Field	Moist Floodplain	July 26, 2007

0 – 100 meters

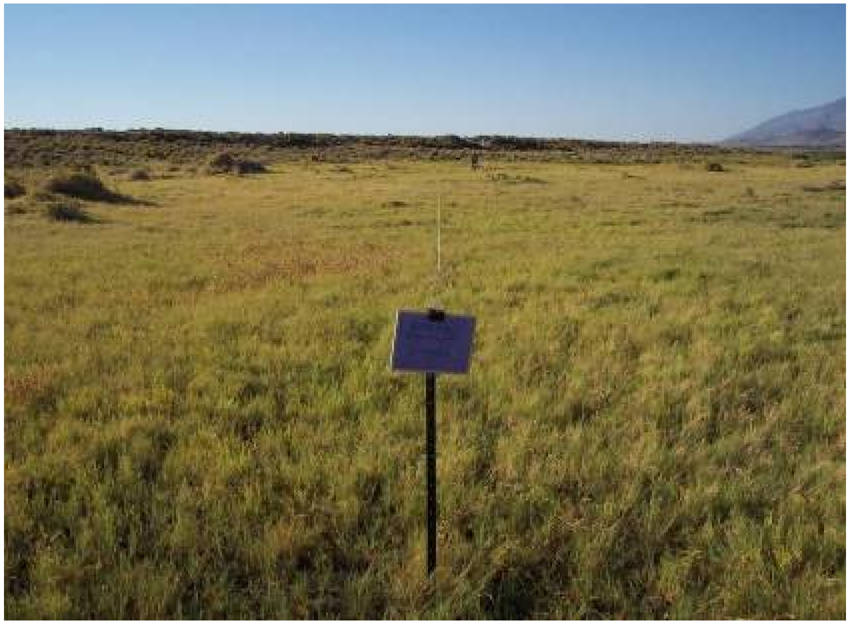
100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
ISLAND_11	River Field	Moist Floodplain	August 27, 2008



0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
ISLAND_11	River Field	Moist Floodplain	July 23, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

APPENDIX 3 – SECTION 6

LOWER OWENS RIVER PROJECT

Range Trend Monitoring Site Photos

Lone Pine Lease (RLI - 456)

2002 – 2009

Transcect	Pasture	Ecological Site	Sampling Date
LONEPINE_01	River Field	Moist Floodplain	August 23, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_01	River Field	Moist Floodplain	June 16, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_01	River Field	Moist Floodplain	June 7, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_01	River Field	Moist Floodplain	July 31, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_01	River Field	Moist Floodplain	July 28, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_02	River Field	Moist Floodplain	August 23, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_02	River Field	Moist Floodplain	June 17, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_02	River Field	Moist Floodplain	June 10, 2004

0 – 100 meters

100 - 0 meter

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_02	River Field	Moist Floodplain	August 1, 2007

0 – 100 meters

100 - 0 meter

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_02	River Field	Moist Floodplain	July 28, 2009

0 – 100 meters

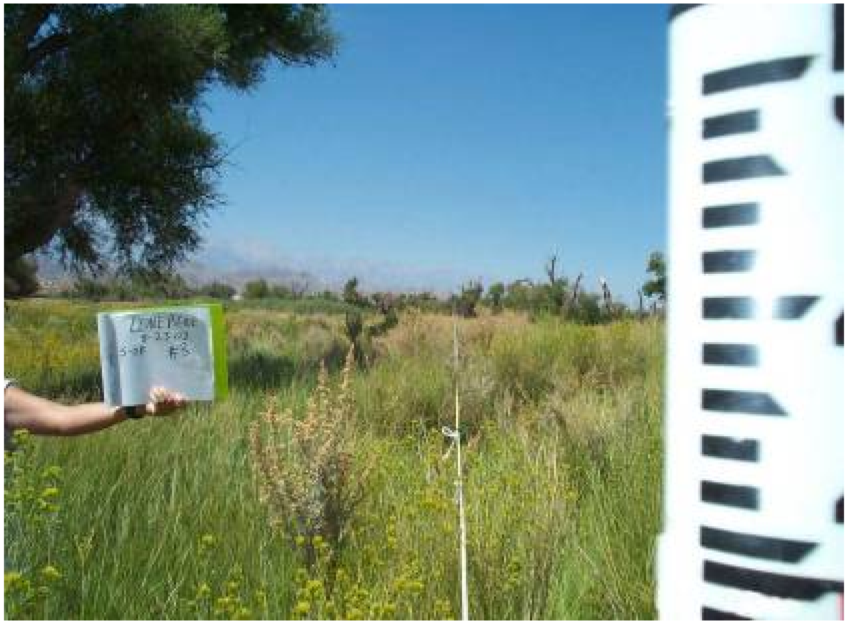
100 - 0 meter

0 meters

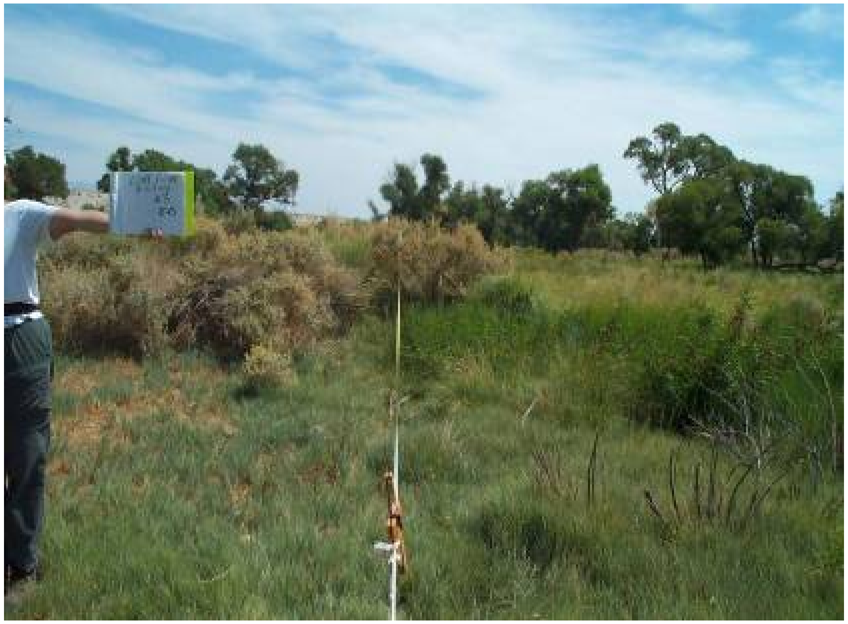
51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_03	River Field	Moist Floodplain	August 23, 2002



0 – 100 meters



100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_03	River Field	Moist Floodplain	June 17, 2003

0 – 100 meters

100 - 0 meter

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_03	River Field	Moist Floodplain	June 9, 2004

0 – 100 meters

100 - 0 meter

0 meters

Photo Not Available

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_03	River Field	Moist Floodplain	August 1, 2007

0 – 100 meters

100 - 0 meters

0 meters

51meters

99meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_03	River Field	Moist Floodplain	July 28, 2009

0 – 100 meters

100 - 0 meters

0 meters

51meters

99meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_04	River Field	Moist Floodplain	August 23, 2002

0 – 100 meters

100 - 0 meters

Photo Not Available

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_04	River Field	Moist Floodplain	June 17, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_04	River Field	Moist Floodplain	June 10, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_04	River Field	Moist Floodplain	August 1, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_04	River Field	Moist Floodplain	July 28, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_05	Johnson Pasture	Sodic Fan	August 23, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_05	Johnson Pasture	Sodic Fan	June 17, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

Photo Not Available

99 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_05	Johnson Pasture	Sodic Fan	August 1, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_05	Johnson Pasture	Sodic Fan	July 28, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_06	River Field	Moist Floodplain	June 19, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	**Pasture**	**Ecological Site**	**Sampling Date**
LONEPINE_06	River Field	Moist Floodplain	June 10, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_06	River Field	Moist Floodplain	June 4, 2005

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_06	River Field	Moist Floodplain	July 30, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_06	River Field	Moist Floodplain	July 28, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_07	River Field	Moist Floodplain	August 7, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
LONEPINE_07	River Field	Moist Floodplain	July 28, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

APPENDIX 3 – SECTION 7

LOWER OWENS RIVER PROJECT

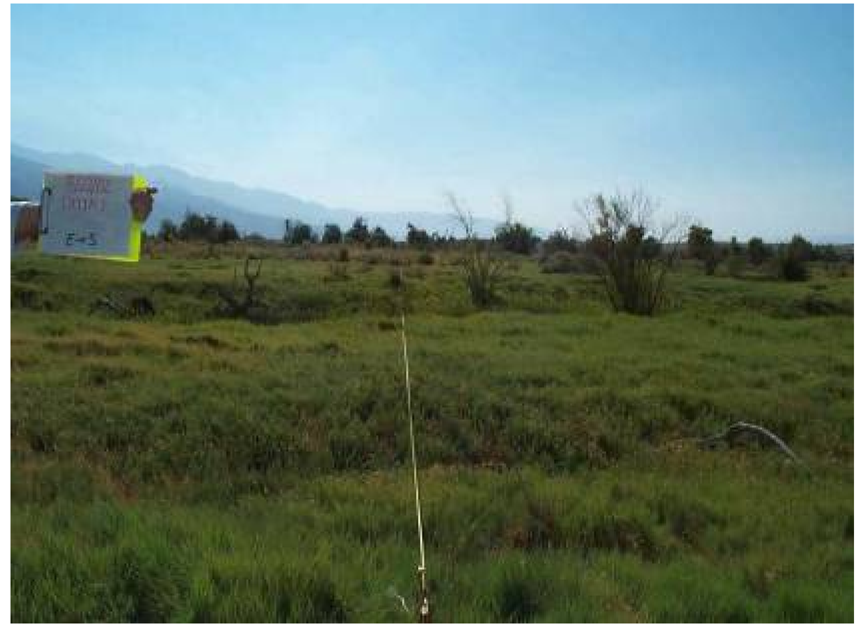
Range Trend Monitoring Site Photos

Delta Lease (RLI-490)

2002 – 2009

Transect	Pasture	Ecological Site	Sampling Date
DELTA_01	Delta Field	Moist Floodplain	August 22, 2002

0 – 100 meters



100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_01	Delta Field	Moist Floodplain	June 16, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_01	Delta Field	Moist Floodplain	June 3, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_01	Delta Field	Moist Floodplain	July 17, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_01	Delta Field	Moist Floodplain	July 22, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_02	Delta Field	Moist Floodplain	August 22, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	**Pasture**	**Ecological Site**	**Sampling Date**
DELTA_02	Delta Field	Moist Floodplain	June 18, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_02	Delta Field	Moist Floodplain	June 9, 2004

Photo Not Available

0 – 100 meters

100 - 0 meter

Photo Not Available

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_02	Delta Field	Moist Floodplain	July 24, 2007

0 – 100 meters

100 - 0 meter

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_03	Delta Field	Moist Floodplain	August 22, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_03	Delta Field	Moist Floodplain	June 18, 2003

0 – 100 meters

100 - 0 meter

0 meters

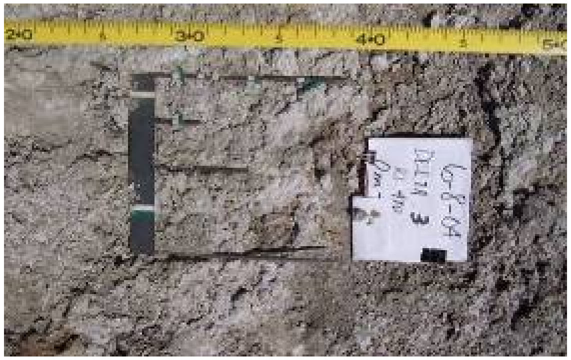
51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_03	Delta Field	Moist Floodplain	June 8, 2004

0 – 100 meters

100 - 0 meter



0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_03	Delta Field	Moist Floodplain	July 24, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_03	Delta Field	Moist Floodplain	July 23, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_04	Delta Field	Moist Floodplain	August 22, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_04	Delta Field	Moist Floodplain	June 18, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_04	Delta Field	Moist Floodplain	June 8, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_04	Delta Field	Moist Floodplain	July 24, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_04	Delta Field	Moist Floodplain	July 23, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_05	Delta Field	Moist Floodplain	August 21, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_05	Delta Field	Moist Floodplain	June 19, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_05	Delta Field	Moist Floodplain	June 7, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_05	Delta Field	Moist Floodplain	July 17, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_05	Delta Field	Moist Floodplain	July 23, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_06	Delta Field	Moist Floodplain	August 21, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_06	Delta Field	Moist Floodplain	June 19, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_06	Delta Field	Moist Floodplain	June 4, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_06	Delta Field	Moist Floodplain	July 23, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_06	Delta Field	Moist Floodplain	July 24, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_07	Delta Field	Moist Floodplain	August 21, 2002

0 – 100 meters

100 - 0 meters

0 meters

50 meters

95 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_07	Delta Field	Moist Floodplain	June 18, 2003

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_07	Delta Field	Moist Floodplain	June 7, 2004

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_07	Delta Field	Moist Floodplain	July 25, 2007

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_07	Delta Field	Moist Floodplain	July 23, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_08	Delta Field		July 22, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	Pasture	Ecological Site	Sampling Date
DELTA_09	Delta Field		July 22, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

Transect	**Pasture**	**Ecological Site**	**Sampling Date**
DELTA_10	Delta Field		July 23, 2009

0 – 100 meters

100 - 0 meters

0 meters

51 meters

99 meters

7.0 WEED CONTROL REPORT

7.1 Introduction

Invasive and noxious weeds are unwanted, nonnative plants that infest large areas or cause economic and ecological damage to an area. In this document, the term noxious weeds are those plants rated as such by the California Department of Food and Agriculture. Noxious weeds are nonnative plant species that are highly competitive, difficult to control, and destructive to native plants and habitats or agriculture. The noxious weeds of primary concern related to implementation of the LORP are perennial pepperweed, Russian knapweed, and saltcedar due to their existing presence in the Owens Valley and the potential for economic and ecological damage. Other noxious weeds are present near the LORP area, but are not discussed specifically since they do not pose the same level of ecological and economic threat as saltcedar, perennial pepperweed, and Russian knapweed. A fourth invasive species, Russian olive, also occurs in the LORP area.

There are several agencies in the Owens Valley with existing programs to control noxious weeds, including the Inyo-Mono Counties Agricultural Commissioner's office, the Eastern Sierra Weed Management Area (ESWMA), Inyo County Saltcedar Control Program, and LADWP.

For description of weeds and treatment methods refer to Section 8 of the *2008 LORP Annual Monitoring Report*.

7.2 Inyo Mono Counties Agriculture LORP Treatment

In 2005, the LADWP and the Inyo/Mono Counties' Agricultural Commissioner's Office (AgComm) entered into a seven year agreement with the goal of managing the growing threat of non-native invasive weeds on lands owned by the City of Los Angeles. In the spring of 2006, AgComm took over treatment of the majority of known weed sites, which in 2005 amounted to 23,560 gross acres. As of October 1, 2009 known weed sites on City of Los Angeles land total 31,031 gross acres, which is more than a 31% larger land area than in the agreement.

In addition to treatment, detection of new weed sites within Inyo and Mono Counties and also within the Lower Owens River Project (LORP) area is a requirement of the Agreement. During certain times of the year, or during the treatment season when conditions do not permit treatment, personnel from AgComm are expected to perform detection surveys to find new sites. Several times each year during the winter, surveys are conducted in areas within the LORP area, and in other areas outside the LORP where surveys have either not been previously conducted or in areas considered high risk. High risk areas would include areas near the Owens River or tributaries thereof, areas that have been disturbed, and areas where livestock or wildlife that move from place to place is present.

The Agreement between LADWP and AgComm focuses on the protection of the LORP area during habitat restoration from noxious weed invasion. This will be accomplished primarily by attempting to eradicate known weed populations within the LORP area, and also by reducing the threat of new invasions by managing upstream populations more aggressively than in previous efforts. The detection component is also critical to the protection of the LORP, as this region is a recovering habitat with many disturbed areas. These conditions can make this area more conducive to weed establishment.

While protecting native habitat during the critical first stage of the lower Owens River re-watering is the paramount goal of this project, there are many other positive consequences that will result from this work. A healthy native plant habitat will support wildlife (including some threatened and endangered species), help to reduce erosion and dust, maintain healthy fire regimes, preserve the viability of open-space agriculture and conserve recreational opportunities. These effects will, in turn, improve quality of life and the local economy of Inyo County.

Inyo and Mono Counties have been uncommonly fortunate in that state rated invasive weeds have not exploded in numbers in our area in the manner which they have in other counties statewide. There may not be a resident of California that is not impacted in one way or another by these invasive plants. The graphic below illustrates the negative impacts of a native plant community that has been invaded by these weedy species. Statewide, hundreds of millions of dollars are lost each year to weeds from associated control costs and loss of productivity. There are now over twenty million acres of weed infested land statewide, threatening local and state agricultural economies, native plants and wildlife (including threatened and endangered species), air and water quality, and property values.

Treatment Activities

In the LORP area specifically, .23 net acres were treated within the 243 gross acres of known infested area. The 243 gross known infested acres are split into 14 separate “sites” for the purpose of monitoring management effectiveness over time. Each site was visited at least twice in 2009, with the exception of new sites found too late in the season to permit multiple visits. The table on the following page outlines management activities for each of the 14 sites.

2009 Site Data - LORP Area

Site Number	Species	Gross Acreage	2009 Dates Treated	Net Acreage	Population Trend
1202	Lepidium latifolium	90	5/21	.01	Unchanged
			9/8	.01	Unchanged
1205	Lepidium latifolium	1	5/29	-	Declining
			8/6	-	-
1206	Lepidium latifolium	1	5/21	-	Declining
			9/2	-	-
1207	Lepidium latifolium	1	5/29	-	Declining
			9/ 8	-	-
1208	Lepidium latifolium	1	5/29	-	Declining
			9/8	-	-
1209	Lepidium latifolium	1	5/29	.02	Expanding
			9/2	-	Declining
1212	Lepidium latifolium	102	9/1	.02	New
			-	-	-
1213	Lepidium latifolium	1	9/1	.02	New
			-	-	-
1214	Lepidium latifolium	1	9/1	.01	New
			-	-	-
1401	Lepidium latifolium	40	5/29	.02	Expanding
			9/9	.01	Declining
1407	Lepidium latifolium	1	5/21	.01	Unchanged
			8/6	0	Declining

1408	Lepidium latifolium	1	5/29	.01	Unchanged
			9/9	0	Declining
1409	Lepidium latifolium	1	5/29	.01	Unchanged
			9/ 9	0	Declining
1410	Lepidium latifolium	1	5/29	.01	New
			9/1	0	Declining

Two new sites were discovered by AgComm in 2009, during the course of routine surveys covering 44,747 acres (as of October 6). In addition to these sites discovered by AgComm, three other new populations were discovered by the LORP Rapid Assessment Survey (RAS) and were confirmed by AgComm and added to the weed location database. During surveys in May, AgComm staff discovered Perennial pepperweed in a ditch (Locust Ditch) fed by the Los Angeles Aqueduct (LAA), and followed the infestation upstream finding significant populations stretching roughly from Manzanar Reward Road to The LAA intake. AgComm notified LADWP of this new infestation and staff from LADWP took appropriate management actions. Additional surveys within the LORP area will be conducted throughout the winter by AgComm.

Monitoring Activities

Monitoring of weed sites is conducted using two methods. These methods are explained below.

Usage to Acreage Data

Spraying equipment is calibrated at least twice per year. This is done by marking out 1/10 of an acre, and then covering this area with a water/dye mixture in the same way it would be sprayed if it were a solid stand of weeds. The number of gallons used is then multiplied by 10 to establish a gallon per acre figure for every sprayer.

Daily figures are collected for sprayer usage and site number. Monitoring usage in each site and then converting usage to acreage can ascertain net acreages. These net acreages are recorded in the weed database for each site yearly to track progress over time.

The data collected from daily usage reports is collected and recorded for 100% of sites. This method has been extremely accurate in past years, and is the primary gauge of success used by AgComm when planning future strategies.

7.3 Summary of LADWP LORP Treatment

LADWP staff is certified in treatment of noxious weeds. Staff conducts treatments in known weed infested areas mapped by the Agricultural Commissioner. They also monitor previously treated areas for resprouting, and respond to reports by lessees, LADWP field staff, and the general public.

LADWP treated pepperweed multiple times along the Blackrock Ditch. Also LADWP applied the cut-stump method to Russian olive and Salt Cedar populations in the LORP area in 2008-09 in areas to be seasonally flooded. Russian Olive was treated along Blackrock Ditch, Billy Lake, and Waggoner Slough.

LADWP treated young saltcedar and Russian olive in disturbed areas along the Goose Lake corridor with Habitat®; a California approved aquatic herbicide for foliar treatment.

7.4 Training Program for LADWP Personnel 2009-2010 Fiscal Year

LADWP conducted refresher training programs at each of the three construction yards (Bishop, Independence, and Keeler) for the employees working within the LORP area. The refresher training included identification and reporting of noxious weeds and saltcedar. The *Eastern Sierra Weed Management Area Noxious Weed Identification Handbook* was provided to program participants. The instruction detailed how to accurately describe their locations to aid in verification and timely response and identify the agencies to which sightings of the species should be reported. The training also covered mitigation procedures for weed populations.

7.5 Inyo County Water Department Salt Cedar Treatment Program

During the 2008-2009 field season, the Inyo County Saltcedar field crew; consisting of seven seasonals, one shared, and one permanent employee, cut and treated approximately 170 acres of saltcedar in the Lower Owens River Project. Most of the time this past season was focused north of Billy Lake in water spreading basins created in 1969 to capture an abundant snowpack during an a high runoff year. These spreading basins are located near the Owens River and have become a reservoir of mature saltcedar plants. By cutting and treating these basins adjacent to the river, the long term goal is to reduce the chances of re-infestation along the river.

The current program is funded by annual payments from LADWP specified under the Long-Term Water Agreement, grant funding from the California Wildlife Conservation Board, and funds from LADWP that match grant revenues up to $1,500,000. As of August 2009, LADWP has paid $813,648 in matching funds to treat saltcedar in the LORP.

After review of the Rapid Assessment Survey (RAS) taken in August 2009, the data shows an increasing population of saltcedar resprouts along the LORP Project. Due to limited personnel in the off season (April-September) to treat the resprouts, the current 2009-10 Saltcedar field season staff will be utilizing the 2009 RAS data to prioritize and address the saltcedar resprouts. The first priority will be the reach between the Intake and Billy Lake Return. The Inyo County Saltcedar Program will continue to pile new slash in appropriate areas and work with LADWP to manage the saltcedar.

8.0 DELTA HABITAT AREA ASSESSMENT

8.1. Introduction and Background

8.1.1. Purpose

Field observations of the Delta Habitat Area (DHA) by Ecosystem Sciences (ES) staff during the 2008 field season seemed to indicate that features of the Owens Lake Dust Control Project constructed adjacent to the DHA were having unanticipated effects within the Delta. In order to evaluate the degree of change in conditions, and the potential causes, ES made a recommendation in the *2008 LORP Annual Monitoring Report* to move forward DHA vegetation monitoring tasks that were originally scheduled to take place in 2010 or 2011. In response to the adoption by LADWP and Inyo County Water Department (ICWD) of this recommendation, LADWP staff recommended conducting the Wetland Avian Census in 2009 as well.

This report contains the results for three DHA monitoring efforts originally scheduled for future years: Indicator Species Habitat Monitoring (2010), the Landscape Vegetation Mapping (2011), and Wetland Avian Census (2010). The original schedule for these monitoring tasks was defined in the *Lower Owens River Project – Monitoring, Adaptive Management and Reporting Plan* (Ecosystem Sciences 2008).

This report presents an analysis of the history and development of vegetation and wildlife habitat in the DHA in relation to surface and groundwater influences. An analysis of vegetation and habitat suitability change between 2005 and 2008 was performed to evaluate progress toward project goals and to inform adaptive management recommendations.

The Landscape Vegetation Mapping was conducted by ES. The Indicator Species Habitat Monitoring assessment was also completed by ES. The Indicator Species Habitat Monitoring assessment was informed by vegetation data for the California Wildlife Habitat Relationships model (CDFG-CIWTG 2008) collected by LADWP and ICWD staff conducting the Wetland Avian Census. The Wetland Avian Census was conducted in 2009 by LADWP and ICWD.

8.1.2. Definition of the Delta Habitat Area (DHA)

The Lower Owens River Project Final EIR (LADWP, 2004) identified the DHA as the area bounded on the north by the road crossing that is now immediately south of the Pumpback Station site, on the west by the Dust Control Road (Corridor 1) and Zone 1 of the Owens Lake Dust Control Project, on the east by the Pipeline Corridor (Mainline) and Zone 2 of the Owens Lake Dust Mitigation Program. The southern boundary corresponds with a subtle transition from vegetated wetland confined by shallow dunes and playa to the broadly depressed, unconfined Brine Pool area (DHA Figure 1). Changes in the Owens Lake Dust Control Project since the writing of the LORP FEIR have included an expansion in area of the original “Zones 1 and 2”, and changes in nomenclature. These areas are now referred to as the T-36 cells (shallow flood cells west of the DHA) and the T-29 cells (shallow flood cells east of the DHA).

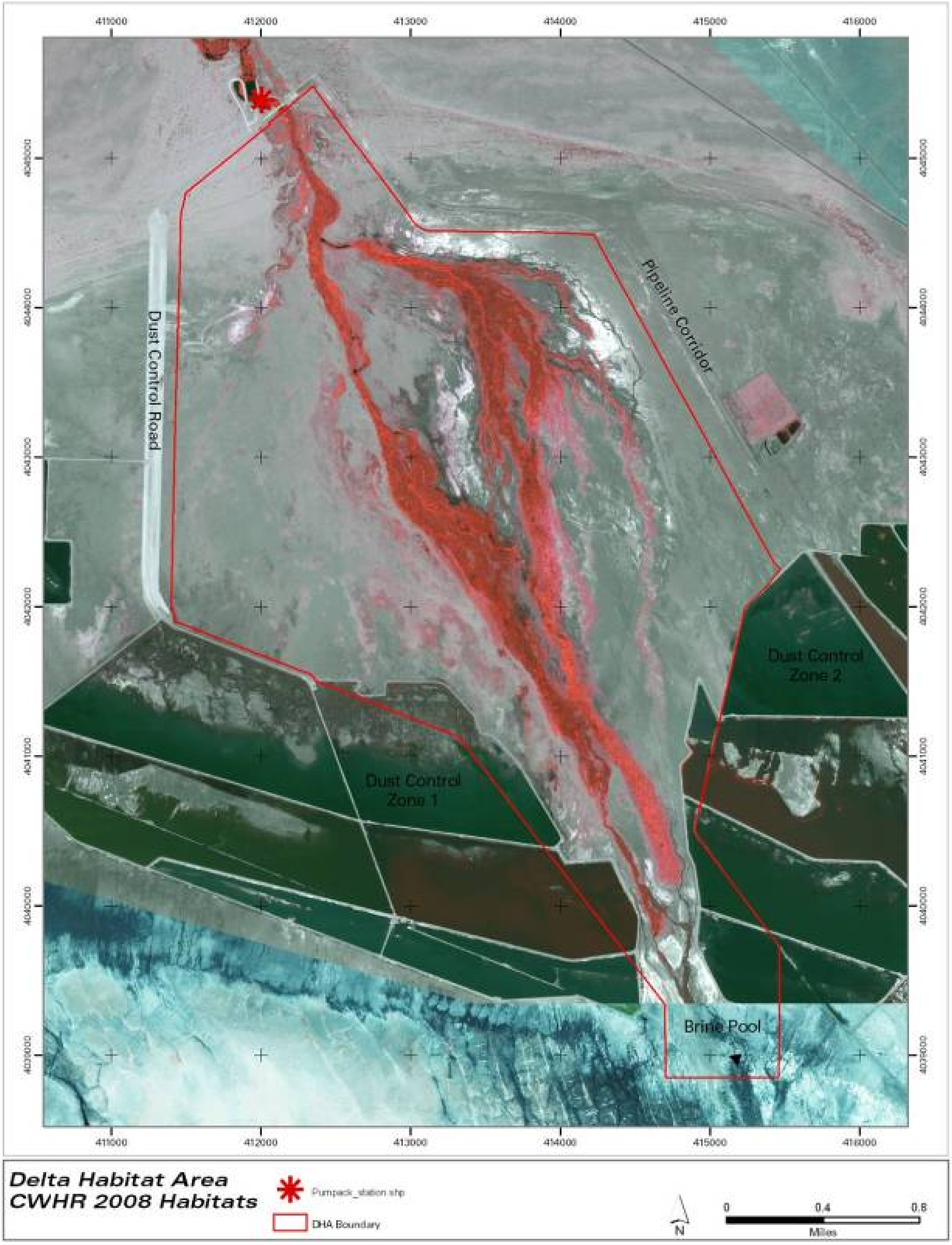
8.1.3. History, Development and Management of the DHA

The Owens River Delta area developed as an open ecosystem (confined only by sand dunes) in which wetlands grew and retreated in response to annual inflow, precipitation, temperature, and other environmental conditions. An evaluation of the historic changes in the Delta area by White Horse Associates (WHA), 2004 indicates that the vegetated wetland areas have moved laterally and longitudinally through time. Following construction of the northernmost components of the Owens

Lake Dust Mitigation Project, the Delta became bracketed by dust control structures (berms and roads), creating a closed ecosystem in which natural migrations and responses to environmental conditions will likely be altered from those typical of past conditions. Recent changes in groundwater and surface water management following LORP implementation are suspected of further altering the function and development of the DHA. Since these are relatively new influences on historic Delta processes, it is unknown to what degree these influences will be adverse or beneficial.

In order to attain MOU goals for the DHA, the current flow regime includes base flows and pulse flows released below the Pumpback Station to the DHA to enhance and/or maintain vegetated wetlands and habitat conditions consistent with the needs of habitat indicator species. Flow releases into the DHA and other management actions are expected to maintain the total area of riverine-riparian and wetland habitat, as well as: (1) convert unvegetated playa to vegetated wetlands; and (2) convert more xeric vegetation types to more mesic vegetation types and open water. The flows are also meant to enhance foraging and nesting areas in the vegetation-playa-water interface for waterfowl and shorebirds.

To determine compliance with flow requirements, flows released to the DHA are monitored and recorded as part of the Pumpback Station management. Flow release data from the Pumpback Station are documented by a continuous recorder module. The monitoring of releases to the Delta from the Pumpback Station will continue over the life of the LORP project.

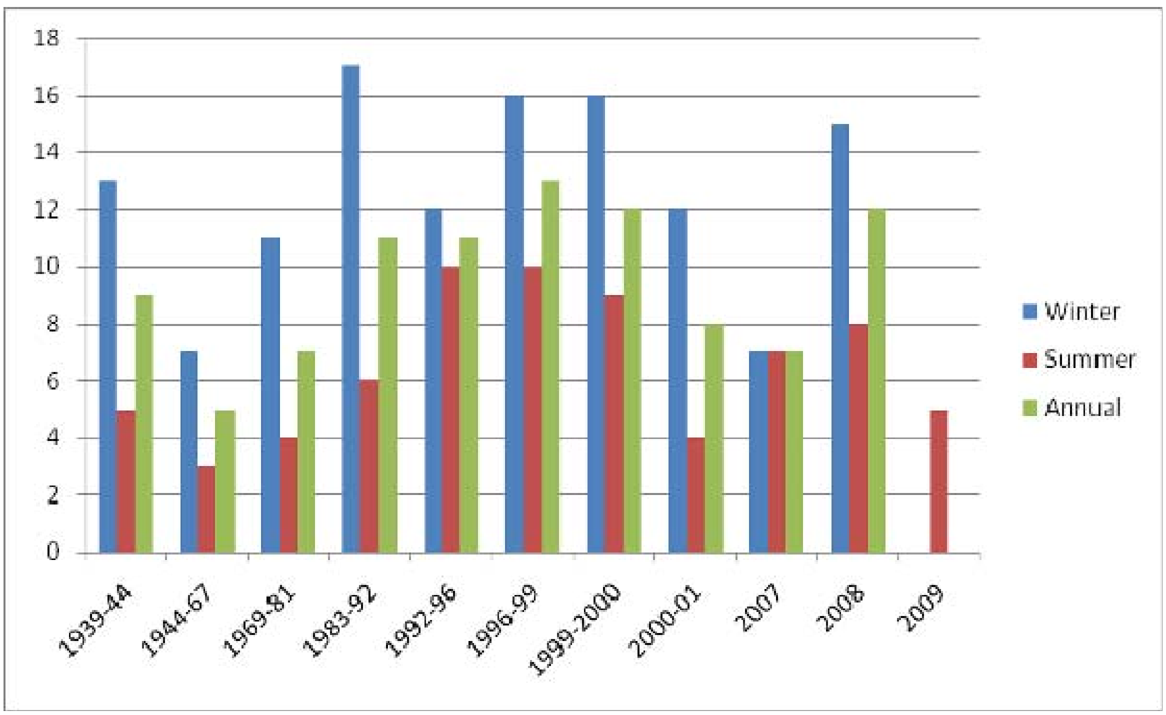


DHA Figure 1. Delta Habitat Area Boundary. September 2008 Quickbird imagery background.

8.2. Existing Information

8.2.1. Surface Water

Prior to the construction of the Pumpback Station and implementation of the LORP, surface water inputs to the DHA fluctuated greatly both seasonally and annually (DHA Figure 2). During the historic period of 1927-1986, winter flows below the Pumpback Station averaged 14 cfs (range 4-214 cfs), while summer flows averaged 26 cfs (range 2-500 cfs) (LADWP 2004). A few notable large water years occurred in the late 1930s, late 1960s and early 1970s (these are not evident on the graph). Flow management into the Delta began in the late 1970s under an agreement between the California Department of Fish and Game (CDFG) and LADWP. From the late 1970s to the mid-1980s, this agreement provided for a constant flow of about 3-4 cfs in the river. In the mid-1980s, this agreement was reaffirmed, and the amount of water was increased by several cfs (Ecosystem Sciences 2000). These year-round flows in the river that provided a small but fairly consistent flow to the Delta area increased Delta wetland and riparian habitat dramatically. In 1993, the Delta supported 422 acres of wetland; in 2000 there were 831 acres; and in 2005, 755 acres existed (WHA 2006).



DHA Figure 2. Estimated Average Inflow (CFS) to the DHA for selected periods of record. Estimated from flows at the Keeler gage, diminished by estimated channel loss between the gage and the DHA (1.6 cfs).

Under LORP, flows to the Delta will average 6 to 9 cfs, with a base flow of no less than 3 cfs. Riverine related LORP flows were initiated in December 2006. Since February 2007, outflows to the DHA have been measured continuously and have ranged from 0.7 cfs (August 2007) to 28.7 cfs (February 2008) (DHA Table 1). The initial flow release in winter 2007 was low (3 cfs) because winter periods exhibit low evapo-transpiration (ET) rates. In early spring 2007, as ET accelerated, the Delta inflow was increased to 7 and then 8 cfs. During the summer of 2007, average flows approached 10 cfs.

In the winter of 2007/2008, unanticipated “gain water” in the Lower Owens River resulted in excess flows released to the Delta between November and February. Pumpback Station calibration and outage problems caused additional unplanned flows to the Delta. The 2008 seasonal habitat flow in late February to early March further contributed to substantial flooding throughout the DHA during the 2007-08 winter period.

DHA Table 1. Average Monthly Flows (cfs) Into the DHA Since LORP Implementation

Month	2007	2008	2009
Jan	-	17.3	6.8
Feb	3.0	25.1	10.3
Mar	3.2	28.7	6.0
Apr	3.0	8.6	3.7
May	4.4	7.1	5.7
Jun	7.6	7.8	8.4
Jul	7.9	8.2	5.9
Aug	0.7	9.7	5.4
Sep	6.9	7.5	
Oct	7.4	5.6	
Nov	9.0	5.1	
Dec	11.0	5.7	
Annual Average	6.6	11.4	

Because of this frequent flooding, no pulse flows were released in 2008. Additional water would have exacerbated the flooding without achieving any of the intended goals of the pulse flows. Also, anecdotal observations during ground and aerial surveys suggested that vegetation changes were occurring as a consequence of extended flooding, possibly affecting diversity and other vegetation community goals.

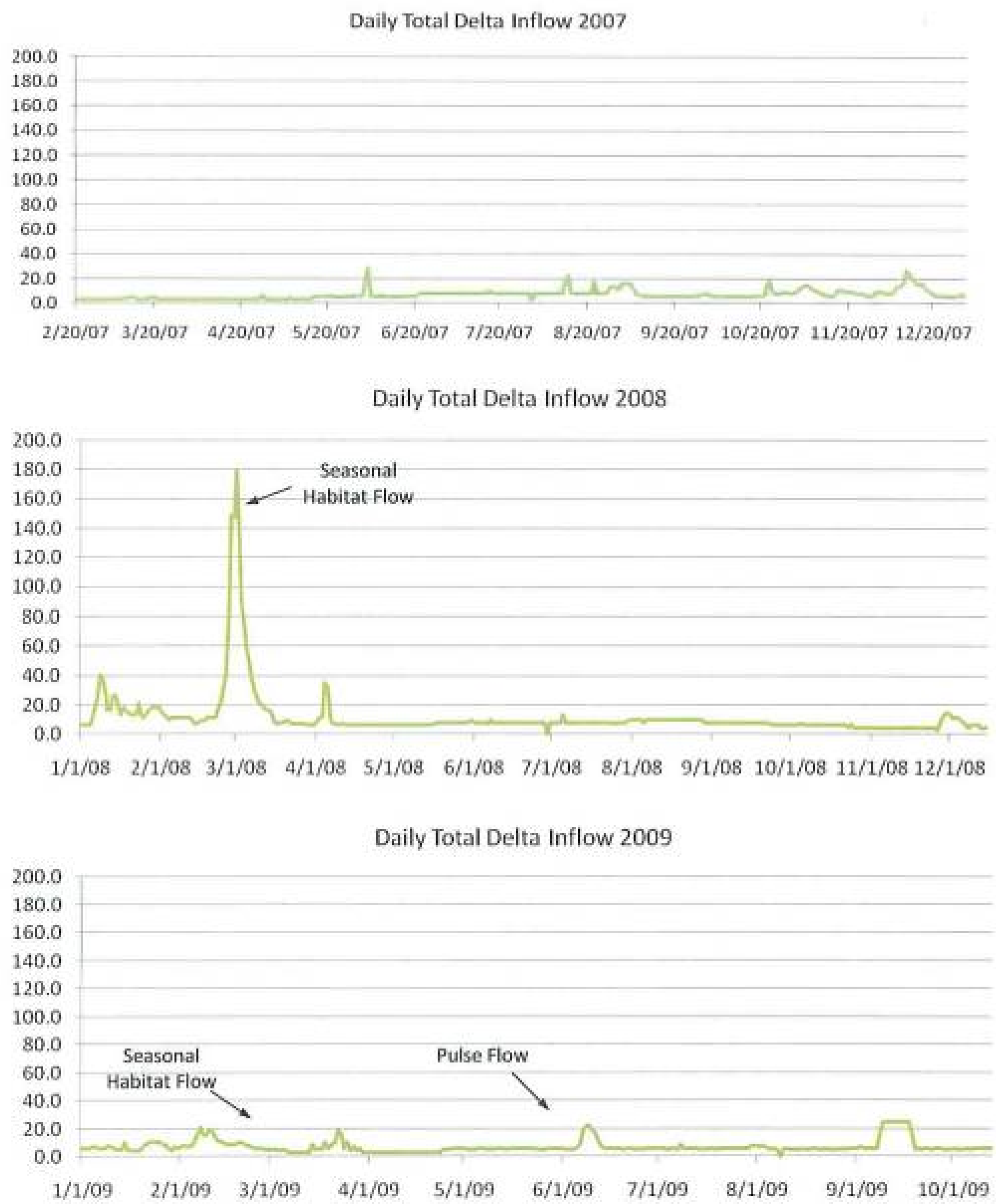
Since the implementation of the LORP, the average summer flows have been 7.3 cfs (as estimated at the Keeler gage, diminished by estimated channel loss between the gage and the DHA (1.6 cfs).

By the winter of 2008-09, the Pumpback Station was reliably measuring and controlling flows, and LADWP flow management had gained sufficient experience to anticipate the onset of ET and “gain water” in the winter, and therefore better manage flow to the DHA. Pulse flows were not released during the first half of 2009 either, based on a decision by the LORP Scientific Team to delay pulse flows until the DHA could be assessed in the summer of 2009. Additionally, the 2008-2009 run-off year was below average and therefore the seasonal habitat flow from the Intake was reduced from the maximum of 200 cfs to 107 cfs. The peak reading recorded at the Pumpback station after release of the seasonal habitat flow was 74 cfs. All additional flow in the river above the capacity of the Pumpback station (50 cfs), were released to the DHA. Base flows and seasonal habitat flow resulted in the presence of surface water throughout the DHA through at least mid-June. The average 2009 flow released to the Delta to date is about 8.2 cfs; thus, the 2009 inflow will probably be less than the 2008 flow.

In late August 2009, as part of routine helicopter investigations of the Delta, the MOU consultants observed large areas of the Delta that were dry, which was typical under preproject conditions. Field personnel conducting avian surveys in the Delta in August 2009 noted that while the area had dried notably since June, flooding of the Delta was much more extensive than was typical of preproject

August conditions. The cessation of flooding of adjacent dust control ponds in July at the end of the dust control season, as well as increased ambient temperatures and ET rates likely contributed to a drying of the area. Because of the observed dryness, the MOU consultants requested that LADWP implement the scheduled September pulse flow of 25 cfs for 10 days. LADWP initiated these releases on September 8 and completed them on September 18. This pulse flow resulted in substantial flooding and open water areas throughout the DHA, and reinvigorated plant communities.

The average daily total inflows into the Delta (weir and the release from the Pumpback combined) since LADWP began reporting daily average flows in February of 2007 (DHA Figure 3) illustrates three very different water years. Although the record is only complete for 2008 (January 1 - February 20, 2007 and October 28 – December 31, 2009 are not included), the timing and magnitude of high flow events are clearly evident. The winter of 2007-08 had multiple high flow events followed by the very large first habitat flow in late February to early March, 2008. The summer is characterized by a relatively stable base flow until the winter period begins in late November, when reduced ET, precipitation and/or groundwater influences dictate the hydrograph. In 2009 the winter period again exhibited a variable hydrograph until the onset of baseflow releases stabilizes the hydrograph into late spring to early summer. The annual habitat flow provided only a modest flow event in mid-June. The September 25 cfs release for 10 days is clearly visible.



**Data began on Feb. 20, 2007 and ended on October 27, 2009. The 2008 hydrograph is therefore the only complete year. Source: LADWP published stream flows.*

DHA Figure 3. Estimated Average Daily Inflow (CFS) to the DHA for Each Year within the Period of Record*

During the establishment of base flows in the first year following project implementation, a combined flow of at least 0.5 cfs passed the two gaging stations on the east and west branches of the Delta. The purpose of maintaining a minimum of 0.5 cfs outflow from the Delta was to ensure sufficient water was entering the wetlands to maintain groundwater and surface water levels and therefore the flows needed to maintain the existing wetland habitat would be known. This flow requirement has been met and the two temporary gaging stations were decommissioned in 2008. The minimum Pumpback Station by-pass is 3 cfs at any time.

The base flow regime (6 to 9 cfs average annual flow) for the Delta is designed to increase water spreading for specific wetland and avian needs. If monitoring indicates that the MOU goals are not being met, or that the "Delta conditions" (as established by the mapping effort using aerial photographs taken prior to implementation of the LORP) are not being maintained, adjustments of daily base flows to the DHA within the 6 to 9 cfs annual average range will be made. Similarly, if monitoring indicates that flows to the Delta can be reduced while still meeting the MOU goals and maintaining the "Delta conditions", flows may be adjusted downward within the 6 to 9 cfs annual average range (ES 2008).

8.2.2. Groundwater

A key component of DHA hydrology is the influence of groundwater. Prior to implementation of the LORP and the Owens Lake Dust Control Project, it was known that a freshwater lens below the Delta exhibited a strong influence on vegetation. It was assumed that higher winter inflows to the Delta would recharge the freshwater lens.

Construction of the Dust Control Areas west of the DHA began in November 2000. Cells east of the DHA became operational in 2001, while areas west of the DHA became operational in 2002. These two shallow flood zones bracket and confine the Delta, redefining the aerial extent of the DHA. This confinement could also influence groundwater levels and distribution, and affect vegetation communities and wildlife habitat. Shallow flooding was initiated many years prior to implementation of the LORP and the release of additional surface water to the DHA starting in 2007.

Studies of the groundwater system at Owens Lake by the Great Basin Unified Air Pollution Control District (District) since shallow flooding began provide insight into current conditions, and how the surface water and groundwater interact (District 2009). The groundwater of the Delta is recharged by a combination of surface flow releases from the Pumpback Station and deep aquifer artesian recharge. Excerpts from the Owens Lake groundwater report by the District characterize the Delta as having coarse-textured soils, relatively high groundwater levels and moderate to low salinity relative to other areas of the lake bed. Shallow groundwater is generally within 3-4 feet of the surface. In near wetted channels the depth-to-water is at or near the ground surface.

The Owens Lake groundwater report concludes that the Delta is one of the few areas on the lake bed where downward surface recharge is greater than evaporation and ET. DHA Figure 4 shows the locations of shallow groundwater monitoring sites and cross-sections associated with the Owens Lake Dust Control Project. DHA Figure 5 shows cross-section B-B', which extends from the north end of the Delta southward onto the playa and the North Sand Sheet. DHA Figure 6 shows cross-section A-A', an east-west transect roughly perpendicular to B-B', and extending across the Delta onto the playa on either side. As illustrated in these figures, a mound in the shallow groundwater is present on the Delta due to recharge from the flow of the Owens River.

The piezometers at 10 feet depth tend to have lower water levels and higher salinity than the co-located 4 feet sites. As shown in DHA Figure 5 and 6, this condition exists until the gradient reverses beneath and laterally to the Delta. This reversal is due to a decreasing influence from the Owens River recharge and an increasing influence from the deep artesian aquifer recharge and evaporative discharge toward the surface, which dominates on the playa.

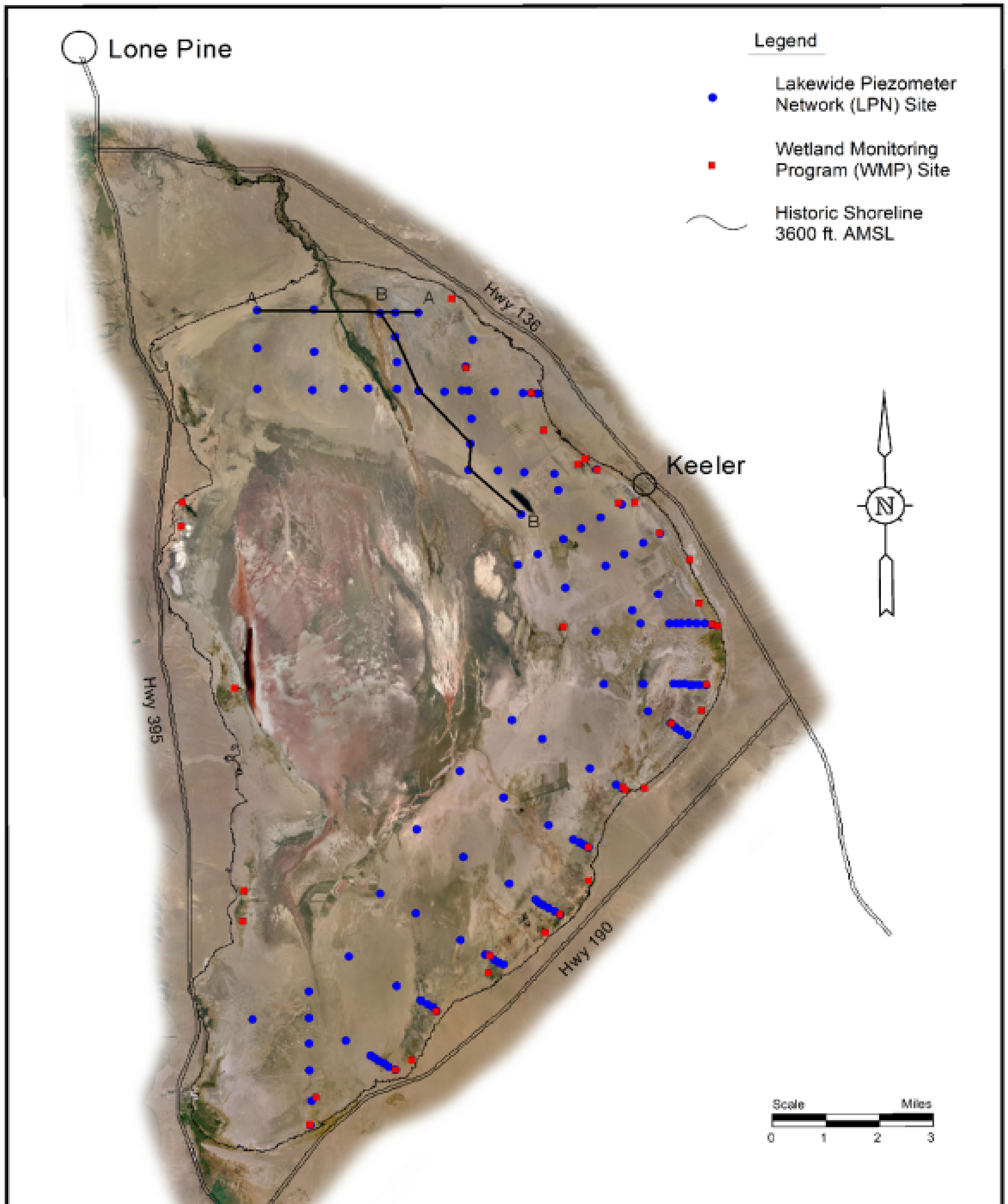
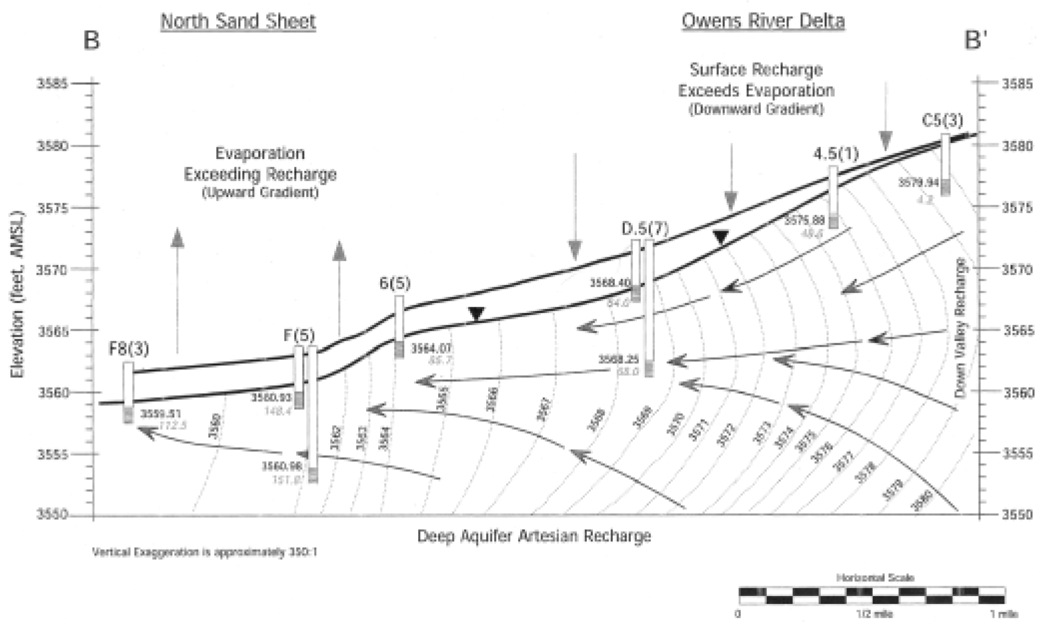


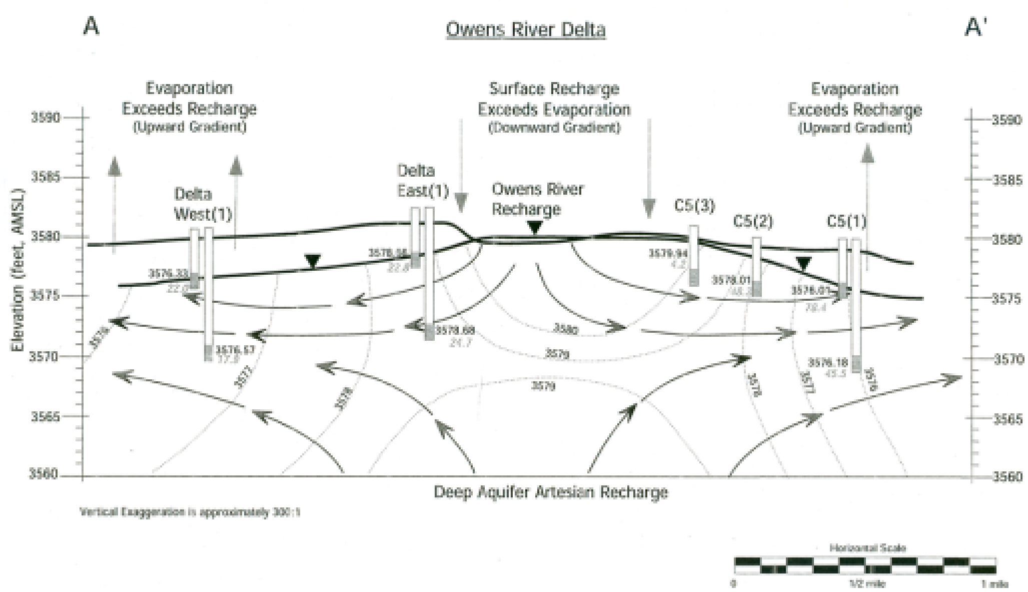
Figure 1. Map of Owens Lake area showing locations of shallow hydrologic monitoring sites. Orthophoto base map by AirPhotoUSA(tm), September 2000. Site locations shown prior to Dust Control Measure projects.

DHA Figure 4. Owens Lake Shallow Hydrology Monitoring Sites and Transects in relation to the DHA.



Conceptual flow and potential of shallow groundwater from the Owens River delta to North Sand Sheet on cross-section B-B', September 1993.

DHA Figure 5. Cross-Section of the DHA along Owens Lake Shallow Hydrology Monitoring transect B-B' (location of transect shown in Figure 4).



Conceptual flow and potential of shallow groundwater across the northern end of the Owens River delta along cross-section A-A', September 1993. Down valley recharge is flowing out of the page (towards the reader).

DHA Figure 6. Cross-Section of the DHA along Owens Lake Shallow Hydrology Monitoring transect A-A' (location of transect shown in Figure 4).

8.3. Vegetation and Habitat Change Analysis

Because of the surface and groundwater conditions, the LORP Scientific Team requested that scheduled pulse flows not be released until DHA conditions could be assessed. To conserve project resources, the Scientific Team changed the scheduled monitoring of the DHA to this year in order to better inform adaptive management recommendations. Using 2008 satellite imagery, the change in vegetation cover and wildlife habitat quality in the DHA between 2005 baseline conditions and 2008 conditions was evaluated. Data acquisition for the DHA began in May 2009 following the seasonal habitat flow. Field verification of remote imagery was conducted in July 2009, and vegetation mapping began in August 2009.

8.4. Landscape Vegetation Mapping

8.4.1. Baseline Mapping

The LORP-EIR (2004) states:

> *Prior to the implementation of the LORP, the water and vegetated wetlands in the Delta Habitat Area will be mapped from Aerial photographs. This map will serve as the description of the "Delta Conditions." The aerial photographs that we used to develop the "Delta Conditions" map (as well as those to be used in future monitoring) will be taken between June and September. The Delta Habitat Area (DHA) will be mapped from high-resolution (0.6 meter pixels) IKONOS images dated August 2005. The inventory of 2005 conditions will define the "Delta Conditions"*

Thus, in 2006 WHA mapped the baseline conditions of the DHA using remote sensing techniques based on IKONOS imagery from 2005 (DHA Figure 7) (WHA 2006). WHA mapped 3578.1 acres of habitat within the DHA, including 755.2 acres of wetland habitats (DHA Table 2).

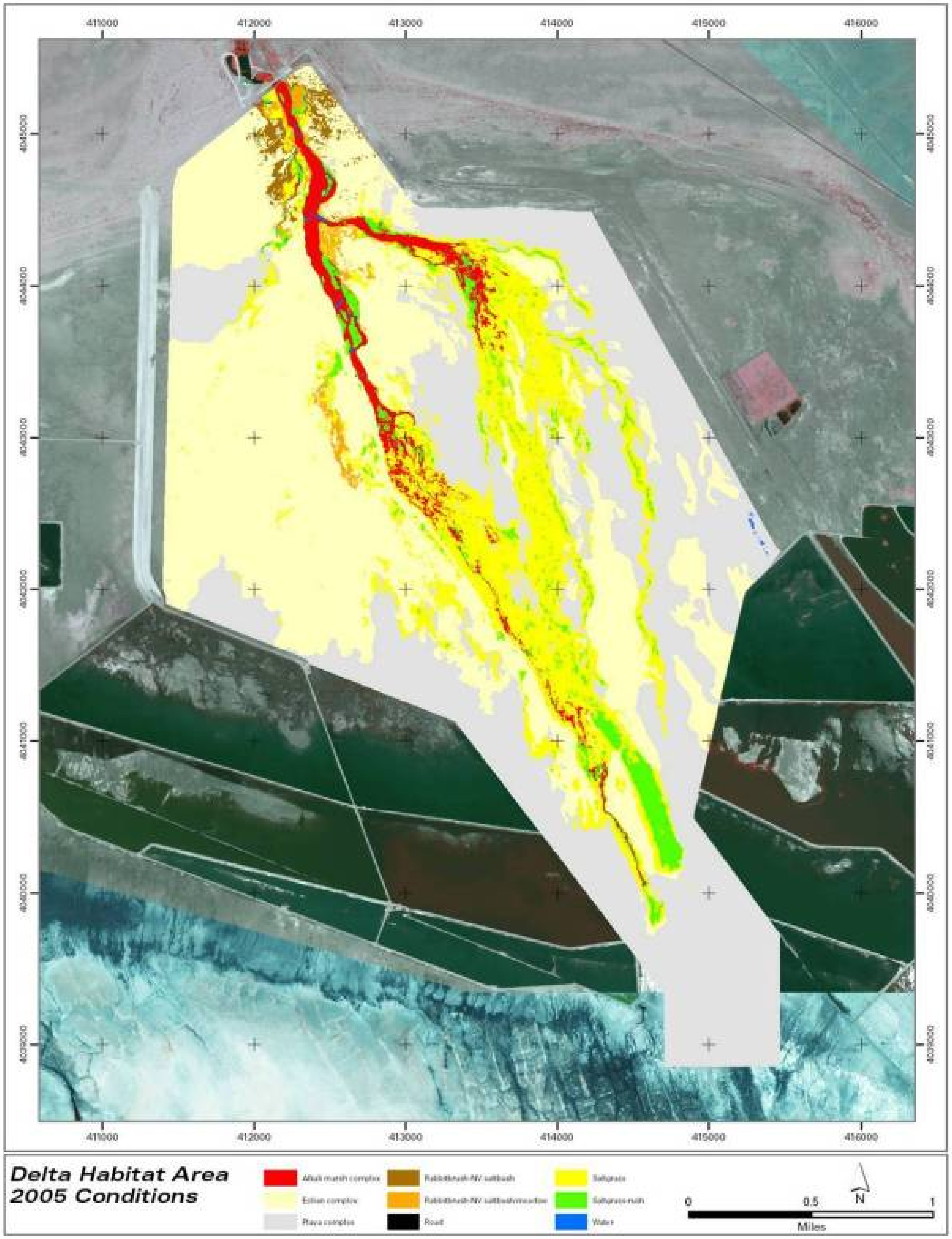
8.5. 2009 Vegetation Mapping

ES mapped the vegetation of the DHA in 2009 using methods consistent with WHA 2006 (Delta Habitat Area Inventory 2005 Conditions). For an overview of the methods used see Section 4.4.4 Landscape Vegetation Mapping of the LORP Monitoring, Adaptive Management and Reporting Plan (ES 2008). Vegetation communities were delineated using remote sensing software (Erdas Imagine Professional). Quickbird imagery dated September 2008 was the medium used for the remote sensing. Quickbird imagery consists of 4 bands: red, green, blue and near infra-red. ES relied heavily on Band 4, the near infra-red band, to delineate vegetation community boundaries in the DHA. ES adopted the land cover classification from WHA 2006 and mapped to the vegetation association level. See Appendix 1 for description of the vegetation associations that were mapped in the DHA by WHA (2006).

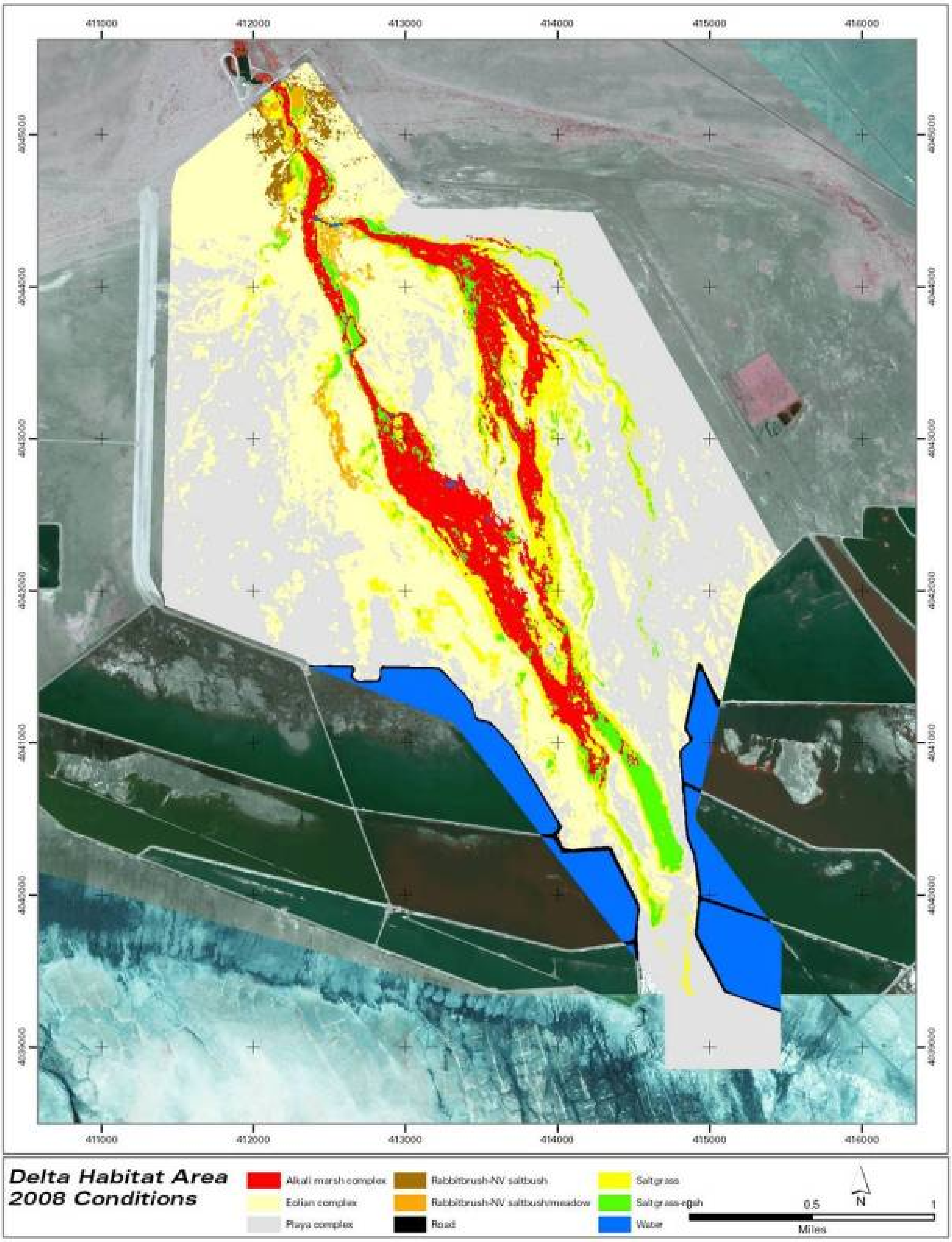
8.5.1. Results

The current conditions of the DHA differ from baseline conditions in a number of ways. Most noticeable is the presence of Owens Lake dust control cells within the boundary of the DHA (DHA Figure 8). Between 2005 and 2008 the LADWP completed the expansion of the dust mitigation cells that bracket the DHA, further constraining the southern end of the DHA. When the Quickbird Imagery was taken in September 2008 and when field surveys were performed in summer 2009, the dust control cells were filled with water. Thus, the extent of open water in the DHA in 2008 (247.0 acres) is significantly more than baseline conditions (4.4 acres -Table 2). Yet, 245 acres of open water in 2008 is contained with the Dust Mitigation Project's cells. Therefore, within the vegetated wetland area of the DHA, open water actually decreased compared to baseline conditions (from 4.4 acres to 2.0 acres).

The decrease in open water in the DHA between 2005 and 2008 is most likely attributable to the proliferation of Alkali marsh complex. Alkali marsh is a vegetated wetland that is often permanently flooded or saturated. Flow regime changes, including the establishment of base flows to the Delta since the onset of the LORP has enabled Alkali marsh to expand within the DHA. Open water areas have likely closed in with increased tule and cattail coverage. Alkali marsh has established in areas that were previously too dry, or experienced seasonal drying that limited the establishment of alkali marsh. These areas now inhabited by alkali marsh used to be dominated by saltgrass-rush or saltgrass associations. Thus, the overall area inhabited by saltgrass-rush or saltgrass association types decreased by 263 acres between 2005 and 2008, while the overall acreage of alkali marsh increased by 194.3 acres.



DHA Figure 7. Baseline Conditions of the DHA



DHA Figure 8. Current Conditions of the DHA

DHA Table 2. DHA Vegetation Association Acreages in 2005 and 2008

	2000	2005		2008		Association Change 2005-2008
Association Name	**Acres**	**Acres**	**Wetland Acres**	**Acres**	**Wetland Acres**	**Acres**
Alkali Marsh Complex	210.1	97.9	97.9	292.2	292.2	**+194.3**
Eolian Complex	1260.0	1412.1	0	1094.9	0	**-317.2**
Playa Complex	1401.9	1324.9	0	1439.6	0	**+114.7**
Rabbitbrush-NV Saltbush	0	26.8	0	26.9	0	**+0.1**
Rabbitbrush-NV Saltbush/meadow	7.6	29.1	0	29.6	0	**+0.4**
Saltgrass	501.4	569.8	540.0	306.1	306.1	**-263.7**
Saltgrass-Rush	132.4	112.9	112.9	114.9	114.9	**+2.0**
Water	7.0	4.4	4.4	247.0	2.0	**+242.6***
Road	N/A	N/A	N/A	32.5	0	**+32.5**
Brine Pool	57.9	N/A	N/A	N/A	N/A	
***Total**	**3578.3**	**3578.1**	**755.2**	**3583.7**	**715.2**	

**5.6 acre increase attributable to remote sensing output including polygon along the boundary of the DHA.*

8.6. Analysis of Vegetation Change

The number of wetland acres in the DHA decreased from 755.2 acres in 2005 to 685.4 acres in 2008. This represents a decline of approximately 5% in vegetated wetlands. However, this change in acreage is more likely a result of discrepancies in the mapping efforts, rather than a real decrease in wetlands. Careful examination of the two maps revealed that the 40-acre decrease in vegetated wetlands is a result of where the ecotone was established between Saltgrass associations and upland associations; WHA (2006) established this ecotone further into the uplands than the 2009 ES mapping. Transitions between vegetation types are not something that occur at specific, discrete locations, but rather gradual transitions between the two. This is especially the case with Saltgrass and upland vegetation types, as saltgrass is a common component of upland land types. The combination of WHA 2006 mapping of Saltgrass associations on Eolian lands (not wetlands) and the mapping differences together account for this wetland acreage decrease; there does not appear to be a true loss of wetland acreage.

Associated with these mapping discrepancies, from 2005 to 2008 there is a decrease in area of the Eolian complex association (317.2 acres) and the increase in area of the Playa complex (114.7 acres). (DHA Table 2) These changes are most likely a result of differences between imagery sets, as both associations are characterized by a high degree of bare ground or the presence of sparse vegetation. Cover types with similar digital signatures can cause errors in classification. Within the Eolian complex are unvegetated or sparsely vegetated areas whereas Playa complex is described as bare ground with sparse saltgrass, making it difficult to discern the two complexes using remote sensing techniques. Ground surveys noted errors between these two complexes in the 2005 data, which most likely also occur in the 2008 data. Ground surveys for the recent mapping were aimed at alleviating this issue, but not all errors were detectable. Thus, the change between these complexes from 2005 to 2008 must be viewed in the context that errors exist in both data sets. The differences between 2005 and 2008 in the Eolian complex and Playa complex are not necessarily project related, but likely a classification issue that is ancillary to the vegetation and habitat goals of the DHA.

8.7. Indicator Species Habitat Monitoring

Habitat monitoring for indicator species in the DHA is a mandatory component of the LORP. Indicator species habitat monitoring is designed to document change in habitat conditions in the DHA for a suite of species that represent the full array of potential species inhabiting the area. Changes in habitat for indicator species are analyzed using the California Wildlife Habitat Relationship System (CWHR) (CDFG-CIWTG 2008). Association types mapped in 2005 and 2008 were cross-walked to their equivalent CWHR habitat to perform the indicator species habitat analysis. Section 4.4.3 of the *LORP Monitoring Adaptive Management and Reporting Plan* (ES 2008) contains additional information on habitat monitoring for indicator species in the DHA.

8.7.1. Baseline

Six CWHR habitat types were evaluated in the DHA: Alkali Scrub, Barren, Fresh Emergent Wetland, Perennial Grassland, Riverine and Wet Meadow. Descriptions of each CWHR habitat can be found in Appendix A. In 2005 the most abundant habitat type was Alkali Scrub, a shrub dominated habitat covering roughly 1470 acres of the DHA (DHA Table 3). Barren, a non-vegetated habitat, was second in abundance (DHA Table 3). The primary habitat types important to DHA indicator species are Fresh Emergent Wetland (97.9 acres), Perennial Grassland (569.8 acres), Riverine (4.4 acres), and Wet Meadow (112.9 acres). These correspond to alkali marsh complex, saltgrass, water, and saltgrass-rush habitat types used during the mapping effort. DHA Figure 9 shows the CHWR habitat types present in the DHA under baseline conditions (2005).

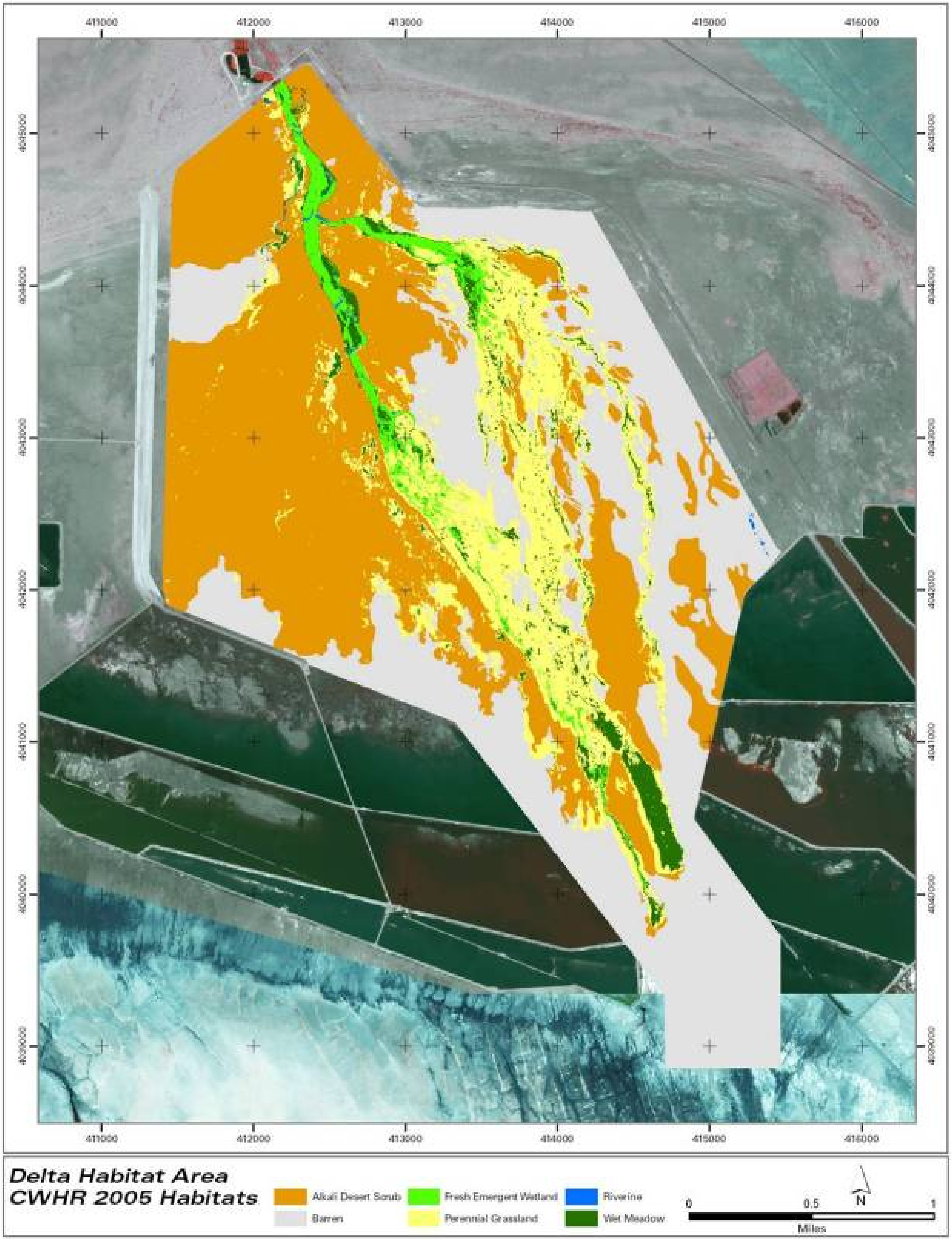
WHA (2004) mapping identified landforms such as eolian, floodplain, and lacustrine. A substantial portion of Barren landtype was on lacustrine land. It is apparent from photo monitoring of the DHA conducted by LADWP that these lacustrine lands are periodically flooded. They may be more appropriately classified under the CWHR system as periodically-flooded lacustrine lands. Periodically flooded lacustrine land has higher habitat suitability for many of the indicator species than does the Barren habitat type. Future analyses of habitat indicator species conditions will classify unvegetated areas that are periodically flooded as periodically-flooded lacustrine habitat type.

8.7.2. Current

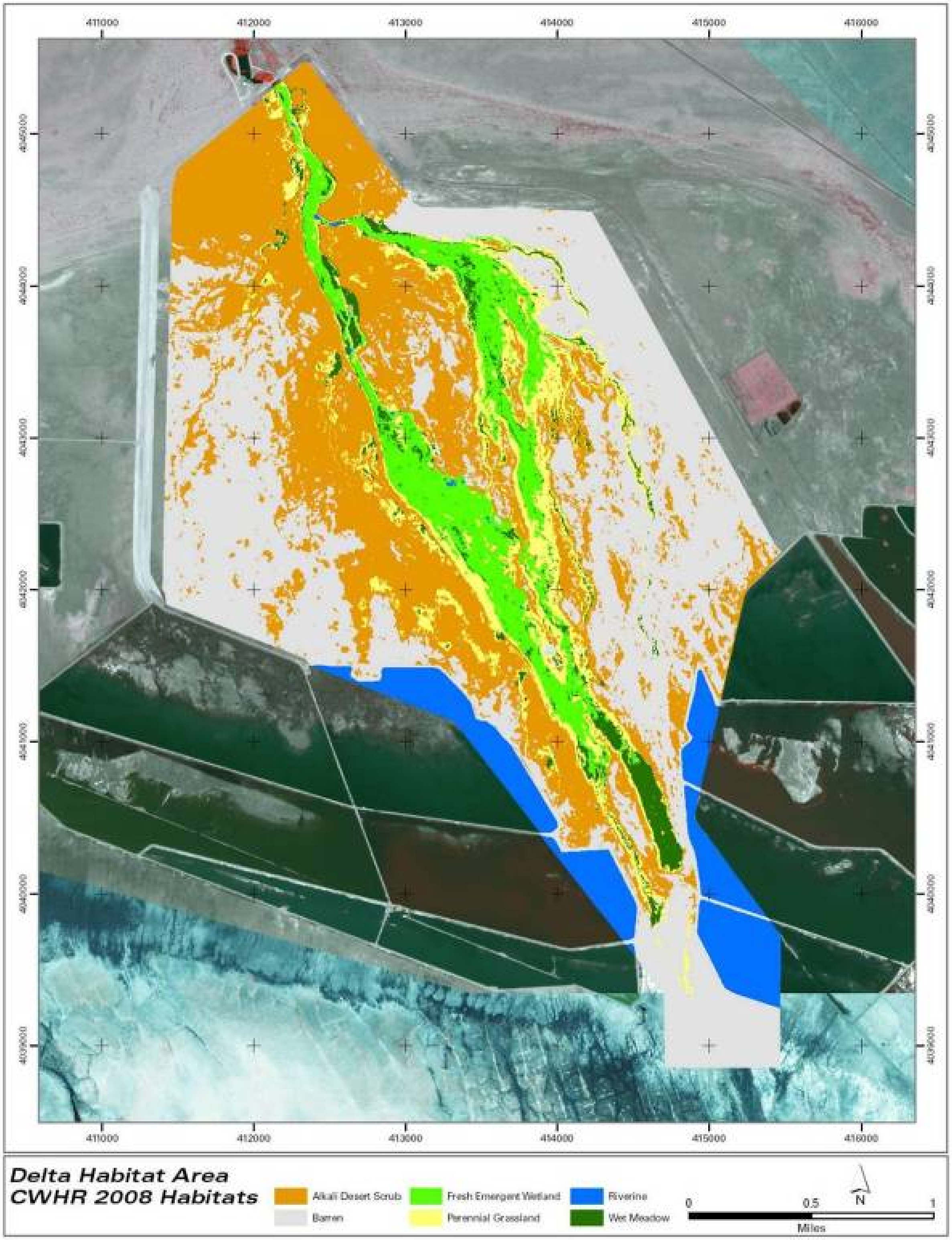
Habitat for indicator species changed in the DHA from 2005 to 2008. DHA Figure 10 shows the current distribution of CHWR habitat types in the DHA as determined by the 2008 mapping efforts. A significant change is the inclusion of the Lacustrine (open water) habitat type in 2008. This new habitat type was added because the dust control cells for the Owens Lake Dust Mitigation Project were filled, adding approximately 245 acres of open water to the habitat matrix of the DHA. This “new” habitat type significantly changed the DHA and the associated habitat for some indicator species. In 2008 the vast majority of open water resides in the Owens Lake Dust Mitigation project cells, which are subject to drying cycles and thus should not be considered a permanently available habitat type for indicator species.

The most notable change between 2005 and 2008 was the increase by approximately 194 acres of Fresh Emergent Wetland habitat (Table 3). This increase is attributable to the continuous flow to the DHA since the implementation of the LORP, allowing Fresh Emergent Wetland to colonize areas that previously lacked the soil moisture or water availability. This increase in Fresh Emergent Wetland caused the Perennial Grassland habitat to decrease, as much of the area that the Fresh Emergent Wetland Habitat colonized was previously occupied by Perennial Grassland or Wet Meadow..

Overall habitat diversity in the DHA increased between 2005 and 2008. Habitat diversity was measured using the Shannon-Weiner Diversity Index. The Shannon-Weiner Diversity Index is an accepted method of calculating habitat diversity because it incorporates both habitat richness and evenness into a single index. In 2005 the habitat diversity of the DHA achieved a value of 1.2; while in 2008 the DHA diversity value increased to 1.4. This increase diversity is due to the increases evenness of the vegetation types (e.g. alkali marsh and Saltgrass acreages have become more balanced). These two values seem to indicate diversity is increasing in the DHA. It can be assumed that project management actions (i.e. established base flow, supplementary flow to the DHA from the LORP seasonal flow, and seasonal pulse flows to the DHA) have contributed to these changes.



DHA Figure 9. Baseline CWHR Habitat Types of the DHA



DHA Figure 10. Current CWHR Habitat Types of the DHA

DHA Table 3. CWHR Habitat Types, acreage and diversity differences- 2005 and 2008

CWHR 2005	Acres	CWHR 2008	Acres	Difference
Alkali Scrub (ASC)	1468.1	Alkali Scrub (ASC)	1151.4	-316.7
Barren (BAR)	1324.9	Barren (BAR)	1472.0	+147.2
Fresh Emergent Wetland (FEW)	97.9	Fresh Emergent Wetland (FEW)	292.2	+194.3
Perennial Grassland (PGS)	569.8	Perennial Grassland (PGS)	306.1	-263.7
Riverine (RIV)	4.4	Riverine (RIV)	2.0	-+2.4
Lacustrine	N/A	Lacustrine	245.0	+245.0*
Wet Meadow (WTM)	112.9	Wet Meadow (WTM)	114.9	+2.0
Total	**3578.1**	**Total**	**3583.7**	
Shannon Weiner Diversity Index =	**1.2**	**Shannon Weiner Diversity Index =**	**1.4**	

8.8. Guild Analysis

The BioView application enables managers to analyze changes in the DHA for avian species and guilds using the CWHR. Presented below is the change over time for three avian indicator species guilds identified in the MOU; Waterfowl, Shorebirds, and Wading Birds. The seasonal avian monitoring in the DHA in 2009 was performed by LADWP and ICWD stafff. The results of the Wetland Avian Census identified the indicator species that regularly occur in the DHA. These regularly occurring species were analyzed using the CWHR BioView application. Field data for pertinent vegetation structure and cover parameters were taken during mapping field survey and avian surveys. Both of these data sets were utilized to compute the parameters entered into the BioView application. The results of the BioView application for each individual indicator species listed in DHA Table 4 were averaged by guild to analyze changes in the DHA. Habitats are rated for their suitability for a species and guild. Suitable habitat classifications range from no suitability to optimum suitability (DHA Table 5).

DHA Table 4. Guilds and Species

Waterfowl		**Shorebirds**		**Wading Birds**	
Abbreviation	**Name**	**Abbreviation**	**Name**	**Abbreviation**	**Name**
CITE	Cinnamon Teal	AMAV	American Avocet	GBHE	Great Blue Heron
GADW	Gadwall	KILL	Killdeer	GREG	Great Egret
MALL	Mallard	LBDO	Long-billed Dowitcher	SNEG	Snowy Egret
NOPI	Northern Pintail	LESA	Least Sandpiper	WFIB	White-faced Ibis
NSHO	Northern Shoveler	WISN	Wilson's Snipe	BCNH	Black-crowned Night Heron
		LBCU	Long-billed Curlew	AMBI	American Bittern
		WIPH	Wilson's Phalarope	LEBI	Least Bittern

DHA Table 5. Habitat Suitability Classifications

Suitability	Score
No Suitability	0
Low Suitability	1 to 33
Moderate Suitability	34 to 77
High Suitability	78 to 99
Optimum Suitability	100

8.8.1. Waterfowl Guild

Habitat suitability in the DHA for the waterfowl guild changed slightly between 2005 and 2008. Minor increases in suitable habitat classifications were noted in the Perennial Grassland and Wet Meadow habitats, while Fresh Emergent Wetland habitat classification was unchanged and remained high for the waterfowl guild (DHA Tables 6 and 7). Overall the habitat suitability of the DHA for the Waterfowl Guild remained very similar between 2005 and 2008.

DHA Table 6. Waterfowl Guild 2005 Suitability of Habitats in the DHA

Species/Habitat	ASC	BAR	FEW	PGS	RIV	WTM
CITE	0.0	0.0	100.0	0.0	0.0	0.0
GADW	0.0	0.0	67.0	55.9	0.0	55.0
MALL	0.0	0.0	100.0	97.5	0.0	100.0
NOPI	0.0	0.0	78.0	79.5	0.0	77.0
NSHO	0.0	0.0	89.0	65.4	0.0	22.0
2005 Suitability	**0.0**	**0.0**	**86.8**	**59.7**	**0.0**	**50.8**

DHA Table 7. Waterfowl Guild 2008 Suitability of Habitats in the DHA

Species/Habitat	ASC	BAR	FEW	PGS	RIV	WTM
CITE	0.0	0.0	100.0	0.0	0.0	33.0
GADW	0.0	0.0	67.0	60.8	0.0	67.8
MALL	0.0	0.0	100.0	99.9	0.0	100.0
NOPI	0.0	0.0	78.0	77.0	0.0	77.0
NSHO	0.0	0.0	89.0	64.1	0.0	22.0
2008 Suitability	**0.0**	**0.0**	**86.8**	**60.4**	**0.0**	**60.0**

8.8.2. Shorebird Guild

Similar to the Waterfowl Guild minor changes in habitat suitability were observed for the Shorebird Guild. Minor decreases in the suitability of the Perennial Grassland and wet meadow habitat types were observed, although these minor quantitative changes do not change the overall habitat suitability classification for these two habitat types, as the Perennial Grassland remained in the low suitability class for the Shorebird Guild and the Wet Meadow remained moderately suitable. Overall the habitat suitability of the DHA for the Shorebird Guild remained generally low to moderate for all habitat types from 2005 to 2008.

DHA Table 8. Shorebird Guild 2005 Suitability of Habitats in the DHA

Species/Habitat	ASC	BAR	FEW	PGS	RIV	WTM
KILL	32.8	100.0	0.0	44.6	0.0	45.0
AMAV	0.0	100.0	12.0	0.0	0.0	44.0
LBCU	0.0	67.0	56.0	65.8	0.0	100.0
LESA	0.0	67.0	44.0	0.0	0.0	44.0
LBDO	0.0	67.0	0.0	0.0	0.0	56.0
WISN	0.0	0.0	100.0	0.0	0.0	100.0
WIPH	11.8	0.0	77.0	31.9	0.0	89.0
2005 Suitability	**6.4**	**57.3**	**41.3**	**20.3**	**0.0**	**68.3**

DHA Table 9. Shorebird Guild 2008 Suitability of Habitats in the DHA

Species/Habitat	ASC	BAR	FEW	PGS	RIV	WTM
KILL	8.5	100.0	0.0	33.5	0.0	0.0
AMAV	0.0	100.0	12.0	0.0	0.0	26.2
LBCU	0.0	67.0	56.0	66.9	0.0	100.0
LESA	0.0	67.0	44.0	0.0	0.0	22.0
LBDO	0.0	67.0	0.0	0.0	0.0	24.8
WISN	0.0	0.0	100.0	0.0	0.0	100.0
WIPH	3.1	0.0	77.0	33.0	0.0	66.0
2008 Suitability	**1.6**	**57.3**	**41.3**	**19.1**	**0.0**	**48.4**

8.8.3. Wading Bird Guild

Similar to the Waterfowl and Shorebird guilds, minor habitat suitability changes were noted in the Wading Bird Guild between 2005 and 2008 (DHA Tables 10 and 11). Interestingly, even though the Fresh Emergent Wetland habitat type expanded in the DHA, its overall suitability value for the Wading Bird Guild decreased slightly. The decrease from 81.1 in 2005 to 78.0 in 2008 is notable as a further decrease would change the overall suitability from high to moderate. This decrease in habitat suitability may be the result of time, as the newly established Fresh Emergent Wetland areas of the DHA may not have the same cover and size values that longer established plant communities have. This change is something that should be monitored in the future as the Fresh Emergent Wetland habitat type is valuable to the Wading Bird Guild. Other than the noted slight change in Fresh Emergent Wetland suitability, the majority of habitats in the DHA remained in the low suitability classification for the Wading Bird Guild between 2005 and 2008.

DHA Table 10. Wading Bird Guild 2005 Suitability of Habitats in the DHA

Species/Habitat	ASC	BAR	FEW	PGS	RIV	WTM
AMBI	0.0	0.0	100.0	0.0	0.0	0.0
LEBI	0.0	0.0	100.0	0.0	0.0	0.0
GBHE	0.0	0.0	34.0	34.0	0.0	34.0
GREG	0.0	0.0	67.0	67.0	0.0	44.0
SNEG	0.0	0.0	89.0	0.0	0.0	45.0
BCNH	0.0	0.0	100.0	0.0	0.0	34.0
WFIB	0.0	0.0	78.0	12.0	0.0	22.0
2005 Suitability	**0.0**	**0.0**	**81.1**	**16.1**	**0.0**	**25.6**

DHA Table 11. Wading Bird Guild 2008 Suitability of Habitats in the DHA

Species/Habitat	ASC	BAR	FEW	PGS	RIV	WTM
AMBI	0.0	0.0	100.0	0.0	0.0	0.0
LEBI	0.0	0.0	100.0	0.0	0.0	0.0
GBHE	0.0	0.0	34.0	34.0	0.0	34.0
GREG	0.0	0.0	67.0	66.9	0.0	44.0
SNEG	0.0	0.0	89.0	0.0	0.0	0.0
BCNH	0.0	0.0	100.0	0.0	0.0	15.1
WFIB	0.0	0.0	78.0	12.0	0.0	22.0
2008 Suitability	**0.0**	**0.0**	**78.0**	**20.2**	**0.0**	**15.6**

8.9. Summary of Vegetation and Habitat Change (2005-2008)

The DHA experienced changes to its vegetation associations and habitat for indicator species between 2005 and 2008. There was approximately a 5% decrease in wetland vegetation association types as the acreage mapped changed from 755 acres in 2005 to 715 acres in 2008 The differences between 2005 and 2008 wetland cover is likely very low and may be due to mapping discrepancies. However, the trend of decreasing wetland habitat is consistent with previous studies, as between 2000 and 2005 wetland acreage in the DHA decreased from 831 acres to 755 acres. The increase in the Alkali Marsh Complex from 98 acres in 2005 to over 292 acres in 2008 indicates a significant increase in the availability of water and soil moisture. The additional 194 acre of the Alkali Marsh Complex were likely lands converted from the saltgrass association, which decreased in overall area from roughly 560 acres in 2005 to 276 acres in 2008. Because the Saltgrass (dominated by facultative wetland species) areas converted to Marsh (dominated by obligate wetland species) were already wetland in 2005, there was no net increase in wetland acreage. These areas were simply moved along a hydrologic gradient.

Habitat for indicator species (Waterfowl, Shorebirds and Wading Bird guilds) also changed between 2005 and 2008, but only slightly. However, when the influence of the dust control cells are accounted for, there was very little change in the overall suitability scores for the indicator species guilds. The addition of the Lacustrine Habitat Type (open water mentioned above), which was a habitat type that was not present in the DHA in 2005, is a significant change for the species utilizing the DHA. Lacustrine habitats are important to Shorebirds; the Lacustrine habitats mapped in 2008 scored the highest of any cover type for Shorebirds (moderate suitability). The most significant change in the overall habitat configuration of the DHA, which was noted above and in the Vegetation Association section, is the increase in the extent of the Fresh Emergent Wetland habitat type coupled with the decrease in the Perennial Grassland habitat type. The Fresh Emergent Wetland habitat type had high suitability classification for Waterfowl and Wading Birds in 2008, demonstrating the importance of this habitat type for those indicator species. Overall, the DHA provides adequate and quality habitat for indicator species.

8.10. Wetland Avian Census

Systematic bird surveys are being conducted in the DHA in order to document bird species use, habitat associations, and when possible, breeding status. Bird survey data can be used to better understand the response of bird species including habitat indicator species, to changing habitat conditions in the project area. The Wetland Avian Census monitoring component is being managed by the LADWP.

The entire DHA is 3,578 acres and contains vegetated and unvegetated areas. An aerial overview of the DHA, as viewed from the south, and as it appeared preproject, and in September 2009 can be found in Appendix 7.

Vegetated wetlands in the DHA are distributed along east and west branches that split at the north divergence and re-converge about two miles south. An island of sparsely vegetated uplands exists between the two branches in the northern end of the DHA. Most of the flow from the Owens River follows the west branch. The west branch is largely confined by the existence of a stabilized dune system that begins south of the powerline crossing, and extends south beyond the “elbow”. The east branch is sustained by overflow from the west branch into a confined channel that extends east approximately 0.6 miles. At this point, the there are numerous rivulets and small channels that trend south, and serve to spread water out across a large area. Drainage from these channels and rivulets converges with the west channel before splitting again into a lower east and west branch. Outflow from the lower east and west branch exists as sheet flow over unvegetated playa onto the brine pool transition area which drains to the brine pool.

WHA (2004) conducted baseline mapping of the DHA in 2000, prior to implementation of LORP. WHA also described changes that had occurred in the extent of wetlands in the DHA since 1944 to provide historical perspective. In 1944, vegetated wetlands within the DHA comprised 167 acres. By 1967, the vegetated wetlands had retracted to 42 acres. The wetland acreage was distributed entirely along the west branch to this point. By 1981, the east branch was well established and supported wetland vegetation. Aerial photos of the entire DHA are not available for 1981, and thus the total wetland acreage is not known, but it is apparent that the vegetated areas had expanded since 1967. At the time of development of the MOU (1997), approximately 325 acres of wetland habitats existed. The MOU stated that the goal for the DHA was to "enhance and maintain approximately 325 acres of existing habitat consisting of riparian areas and ponds suitable for shorebirds, waterfowl and other animals" and "to establish and maintain new habitat consisting of riparian area and ponds suitable for shorebirds, waterfowl and other animals within the Owens River Delta Habitat Area". The entire DHA was mapped again in 2005 by WHA. In 2005, a total of 755 acres of vegetated wetlands were present in the DHA. The acreage of vegetated wetlands to be enhanced and maintained in the DHA was ultimately based upon the acreage present in 2005 (755 acres), after certification of the *2004 Lower Owens River Project Final Environmental Impact Report* (LADWP 2004).

> In 2005, 2248.7 acres of the entire 3,578 acres was vegetated, with the remaining acreage supporting playa (1324.9 acres or 37% of total) and flooded open water areas (4.5 acres or 0.1%). Upland vegetation covered 1497.7 acres (41.8%) and was comprised primarily of Parry saltbush scrub, with much smaller amounts rabbitbrush-Nevada saltbush scrub, rabbitbrush-Nevada saltbush meadow, and dry alkali meadow. The 755 acres of vegetated wetlands was comprised of alkali meadow, wet alkali meadow, and alkali marsh. Appendix 1 shows the acreage of habitat types as they existed in 2005 under pre-project conditions. Along the west branch, alkali meadow and wet alkali meadow habitats occur in a narrow border, primarily south of the elbow, whereas these habitats dominate the eastern branch of the DHA. Numerous large saltcedar (*Tamarix ramosissima*) plants exist throughout the DHA, but are most numerous along the east branch. Alkali marsh occurs primarily in the confined channels along the west branch, and northern portions of the east branch.

Methodologies established for the bird survey project used the habitat types delineated in the 2000 mapping effort to document habitats used by birds. The 2000 mapping effort defined 10 habitat types: water, playa, brine pool, alkali marsh, wet alkali meadow, alkali meadow, Gooding-red willow, Parry saltbush, dune and rabbitbrush-Nevada saltbush meadow. In 2005 some habitat types were combined due to difficulties in distinguishing between them on the 2005 satellite imagery, or due to their inherent similarities. For the 2005 mapping effort, playa and brine pool were combined into "playa complex", Gooding-red willow was combined with alkali marsh into "alkali marsh complex", and Parry saltbush and dune were combined into "eolian complex". Appendix 2 shows the acreage of the different habitat types as mapped in 2000 and 2005.

8.10.1. Habitat Indicator Species

The concept of "habitat indicator species" for the four different LORP management areas (Delta Habitat Area, Riverine/riparian management area, Blackrock Waterfowl Management Area, and Off-river Lakes and Ponds) was first described in the 1997 MOU. Habitat indicator species "represent the range of habitat conditions that are desired to be achieved" for each four areas the LORP (Ecosystem Sciences 1999b). Habitat indicator species for the DHA include all resident, migratory or wintering waterfowl, wading bird, and shorebird species (MOU, LADWP 2004, ES 2008). These groups of birds represent the waterbird guilds expected to respond to habitat conditions in similar ways. Since the habitat indicator species list includes all species in the above groups of waterbird species, the entire list includes species both common and expected to occur in the area, as well as species that are rare in the region such as Red-necked Grebe and Brant. Species rare in the region because of their migratory routes or specific ecological needs cannot be managed for or be expected to use the area, and may not be useful by themselves as indicators of habitat quality.

The California Wildlife Habitat Relationships (CDFG-CIWTG 2008) system will be used to track changes in habitats available for habitat indicator species in the DHA.

8.10.2. Site Selection

In 2002, ES initially identified general survey routes for the Delta Habitat area. Two routes were established in the Delta Habitat Area (Delta West and Delta East, Figure 11). The survey routes covered areas dominated by vegetated wetlands, but all habitat types present in the DHA are traversed by one of the two routes. The Delta West route follows the west side of the Owens River channel, from the powerline crossing to approximately 300 meters past the last point of vegetation, based on 2002 conditions, therefore including some of the “brine pool transition area”. The Delta East route follows the east branch, and then traverses extensive wetland habitat east of the river channel, ending at the southern end of the lower east branch. Permanent monitoring stations along each route were selected by LADWP staff and volunteers using handheld Garmin GPS V units. Stations are a minimum of 250 meters apart, and up to 300 meters apart in very open habitat situations. The Delta West route originally consisted of 25 stations, while the Delta East route consists of 17 stations. An ArcView shapefile was created and overlain onto year 2000 aerial photos of the DHA. Two stations on the Delta West route (DW19 and DW21) were deleted after it was determined that they were located too close to the adjacent stations and may result in double-counting of birds. Point count stations were marked in the field with a white-tipped green fence post. A permanent marker was used to mark each fence post with the project name (LORP AVIAN), the survey route and the point number (e.g. “DE13”). Appendix 3 provides the coordinates of each bird survey station (UTM NAD 27, Zone 11, CONUS).

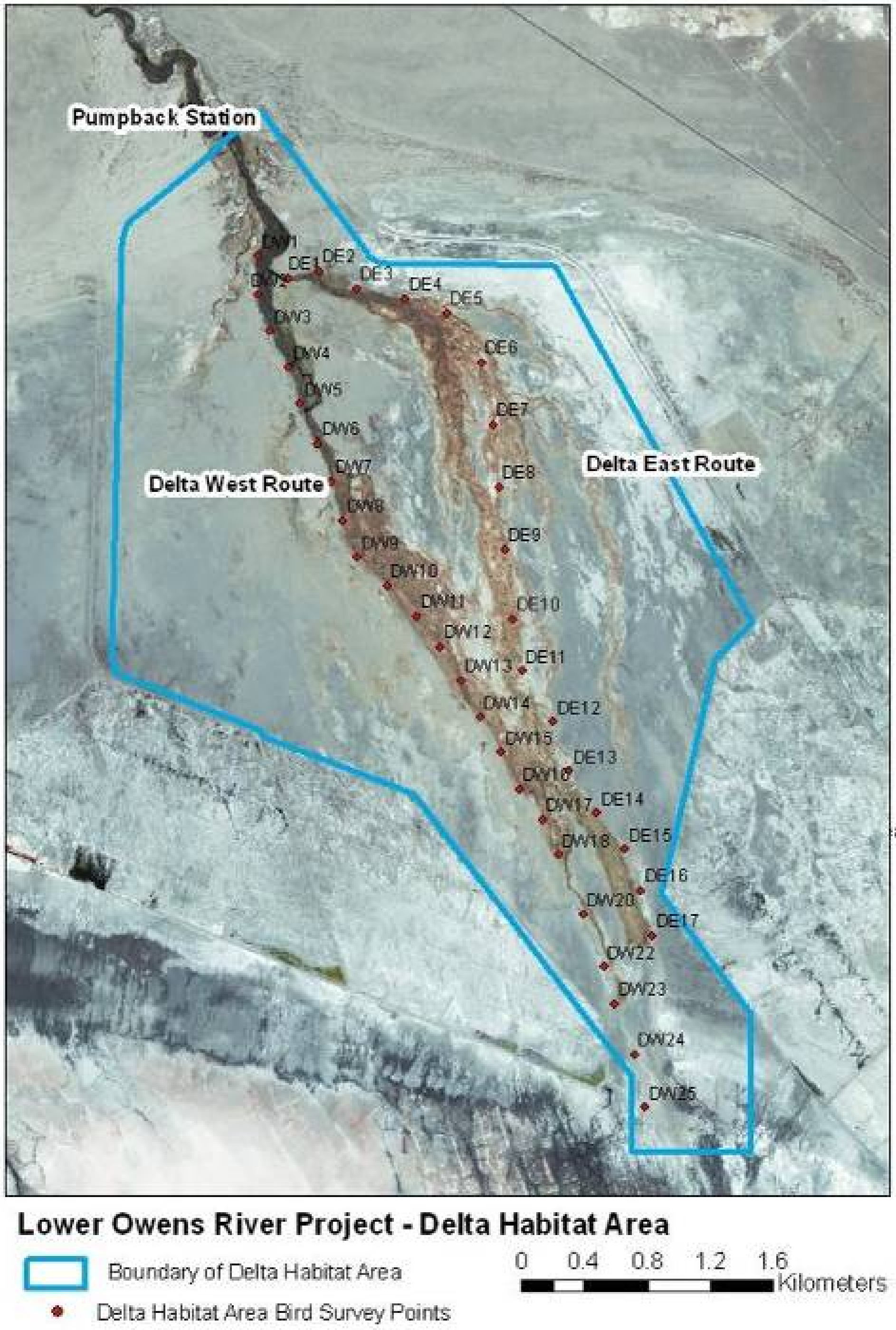
8.10.3. Methods

<u>Survey Schedule</u>

Baseline surveys were conducted in the DHA from spring 2002 to early 2003, and again in 2005. Surveys conducted in 2009 represent the first LORP post-implementation bird surveys in the DHA. Appendix 4 provides the names of personnel conducting surveys and their affiliation.

<u>Pre-project Baseline Surveys</u>

The survey schedule for the 2002-2003 baseline year was discussed and agreed upon by Ecosystem Sciences, LADWP, ICWD, and Point Reyes Bird Observatory. A total of five surveys were conducted during this first baseline year. Surveys were conducted in late-April, late-May, mid-June, mid-August, and mid-October of 2002, and at the end of January, 2003. The late-April and mid-August survey dates were selected with the purpose of detecting migrant shorebirds. The late-May and mid-June surveys were selected to detect breeding species, while the October and January dates were selected to detect migrating and wintering waterfowl species, respectively. Point counts were conducted at each permanent station by LADWP personnel and local volunteers. The two Delta routes were always surveyed on the same day, in the same direction on those days in 2002-2003 (i.e. both observers surveyed north to south on one visit, then south to north the next).



DHA Figure 11. Delta Habitat Area Wetland Avian Survey Routes

Following an evaluation of the data from the initial baseline inventory effort, LADWP staff recommended increasing the number of surveys per year in the DHA in order to increase detection of waterfowl and shorebirds during peak spring and fall migration periods. This increased effort involved four spring surveys at two-week intervals starting the end of March/beginning of April and ending mid-May, two surveys in June to detect or confirm breeding, and five fall surveys conducted at two-week intervals starting the first week of August and ending the end of September or early October. This more intensive survey schedule was followed during additional baseline surveys conducted in 2005, with the addition of a mid-November winter survey. Due to personnel limitations in 2005, both DHA routes were surveyed by one LADWP Watershed Resources staff during one survey day. In order to complete both routes in one morning, point counts were not conducted, however the same route was walked, (as if all stations were visited) and all birds encountered along the route were recorded.

Post-Implementation Survey Schedule

In 2009, surveys were conducted by LADWP and ICWD staff following the same schedule as in 2005. One additional winter survey is scheduled for January 2010 as part of the post-implementation survey schedule. In 2009, the two survey routes were completed by two people walking in opposite directions (i.e. one person surveying Delta West route north to south, while second person surveyed the Delta East route south to north).

Survey Methodology

Surveys were started within one hour of local sunrise time, and generally completed within five hours. The starting point for each route was alternated each visit. Surveys were not scheduled if heavy rain or excessive winds were predicted.

Surveys were conducted through a combination of point counts and area searches. The point count data will allow for the tracking of songbird populations throughout the project period, while the use of all detections (= area search) will be better-suited for the tracking of trends in use of these areas by waterfowl, shorebird, and wading bird species.

Observers recorded all species seen or heard during a 5-minute period at each point count station. Observers were also instructed to record species detected between points, or individuals detected between points, if the observer was certain that the individual had not been already been recorded. Only birds observed in or flying over the DHA were recorded. Birds observed away from the DHA, such as those flying over the dust control ponds, were not recorded. The distance from the observers to each bird detected was recorded during all surveys. In addition, the activity of the bird or birds and the habitat being used at initial detection were also recorded. The activities defined were: singing, calling, flying (associated with habitat), flying over (not using habitat), foraging, perching, breeding, or flushed. If the activity was recorded as “breeding”, one of 10 breeding observation codes was also used to document the specific evidence of breeding seen. Examples of breeding codes include “FC” for food carry, and “MC” for material carry. The breeding observations codes used are consistent with those used by Heath and Gates (2002) during baseline bird surveys in the riverine-riparian management area of the LORP.

Initially (in 2002), sixteen different habitat types were defined by ES for use on this project. These habitat categories differed from those being tracked by mapping, and thus the habitat types used for documenting habitat use was changed to correspond to the vegetation mapping conducted in 2000 by WHA. A crosswalk was developed in order to incorporate the 2002/2003 data on habitat use into the categories used in 2005 and 2009. Although the 2005 mapping combined some habitats, some of these 2000 habitat types will be retained as bird species may respond differently to the structural differences that exist. For example, bird use of Gooding-red willow habitat will continue to be recorded and reported as this habitat is still present in DHA, and bird species respond to the presence of the scattered willow trees. Appendix 1 contains descriptions of the habitat types, and Appendix 7 contains representative photos of each habitat type.

8.10.4. Data Summary

Conditions

Local and regional conditions have varied across the time period covered in this report. Appendix 7 contain photos of each monitoring station taken in 2005 and 2009. Photos are not available for 2002. These photos demonstrate some of the qualitative changes that have occurred since implementation of the LORP. A discussion of conditions encountered during each survey year is also included below as these may help explain or understand patterns of use by birds in the DHA.

Since implementation of the LORP, there has been a more consistent water source for the DHA. There has also been habitat type conversion in some areas – most notably along the northern portion of the east branch. Type conversion has taken place in many areas along the east branch wherein alkali meadow areas have converted to wet alkali meadow, and wet alkali meadow areas have converted to alkali marsh. As many of the photos in Appendix 7 demonstrate, there has also been a general overall increase in the height and vigor of the alkali marsh habitat present preproject. Herbaceous vegetation in meadow habitats is seemingly taller and more dense than preproject. Along the west branch, the general impression is that meadow habitats have expanded westward toward the dust control shallow flood areas. Due to the general increase in height and density of herbaceous, emergent vegetation, some previous open water areas may have contracted in size. Concurrent with changes in the DHA, changes have also taken place in association with the Owens Lake Dust Control Project. Since 2002, the total acreage former lakebed playa receiving some application of water has increased remarkably. The dust control cells that typically support the majority of the waterfowl on the lake on any one time include all of the northern cells adjacent to the DHA. Emergent vegetation is developing in several of these northern dust control cells, and so now supporting nesting ducks. Shorebirds and wading birds have also shown a tremendous response to the dust control project, are numerous, and can be found using shallow flood cells throughout the year.

2002-2003

Prior to implementation of the Lower Owens River Project, the DHA underwent fairly predictable variations in wetted conditions. The area was subject to seasonal inundations wherein cooler temperatures and reduced evapotranspiration rates in the winter resulted in an increase in flooding and a resultant outflow in the brine pool transition area from late fall through early spring. Increased ambient temperatures during spring and summer resulted in a period of drying from spring through early fall. Yearly weather variations affected the timing of the drying and wetting cycles. The first baseline bird survey of the Delta Habitat Area took place in late April 2002. The winter of 2001-2002 was extremely dry regionally with the Owens Valley receiving less than 50% of the long-term average precipitation. Water was present in the brine pool transition area during the late April survey. By late May there was no longer outflow in the transition area. Also in late May, along the Delta West route it was noted that the area was dry south of where the east and west channels meet (approximately DW16). Along the Delta East route, some drying had also occurred, however the larger water-filled depressions and ponds were still flooded. By August, surface water had retreated to about DW07 along the west branch and DE04 on the east branch. By October, reduced evapotranspiration demands resulted in an elevated water table and an increase in the amount of flooding over mid-summer conditions, although the transition area remained dry. The DHA was again flooded with water flowing in the transition area during the January 2003 survey due to decreased ambient temperatures and reduced evapotranspiration.

2005

Four spring surveys were conducted in 2005 between the beginning of April and mid-May. The winter of 2004-2005 was extremely wet with the Owens Valley receiving greater than 150% of normal precipitation. During the spring of 2005, there was extensive ponding along the east side of the main channel that attracted waterfowl and shorebirds. Water was present in the transition area through mid-May, although by the end of spring, water had receded along the east branch to approximately where DE04 is located. Water continued to recede through the summer until surface water was present to about DW05 along the main channel and DE02 along the eastern side. Surface water was more abundant by mid-October and present in the transition area again by mid-November.

2009

The surveys conducted in 2009 were the first post-implementation surveys. The DHA remained wetter later into the season than typical of pre-project conditions. Surface water was present throughout the DHA into mid-June. The mid-summer drying typical of pre-project conditions was not as extensive or dramatic in the summer of 2009. At the beginning of August, surface water was still present as far south as DW23 along the west branch and to DE05 along the east branch, although some surface water persisted in depressions further south of this point. The first DHA pulse flow under LORP occurred in September 2009. This pulse flow was a 25 cfs release from the Pumpback Station for 10 days and was initiated on September 5. There was extensive flooding throughout the DHA during the September 15 survey as a result of the pulse flow. Water 6-10 inches deep was encountered along most of the Delta East route during the September 15 survey and flooding was noted for areas immediately adjacent to the west branch, within the confined channel area. By October 6, most of the flooding had receded, however there was still outflow in the Brine Pool transition area. During the November 17 survey, the majority of the DHA was again flooded, likely due in part to decreased evapotranspiration demands of the vegetation within the DHA. Open water ponds existed between the east and west channels as a result of the flooding, there was outflow in the transition area, and flooding to the west of the DHA, between the west channel and the dust control cells at the south end.

8.11. Bird Use

A total of 152 species have been encountered in the DHA including 78 species along the Delta East route and 94 species along the Delta West Route. Forty-six of these species are designated habitat indicator species for the Delta. Appendix 5 provides the common names, scientific names and four-letter codes of all species detected in the DHA. Appendix 6 provides the common names and scientific names of other wildlife species encountered in the DHA opportunistically during bird surveys.

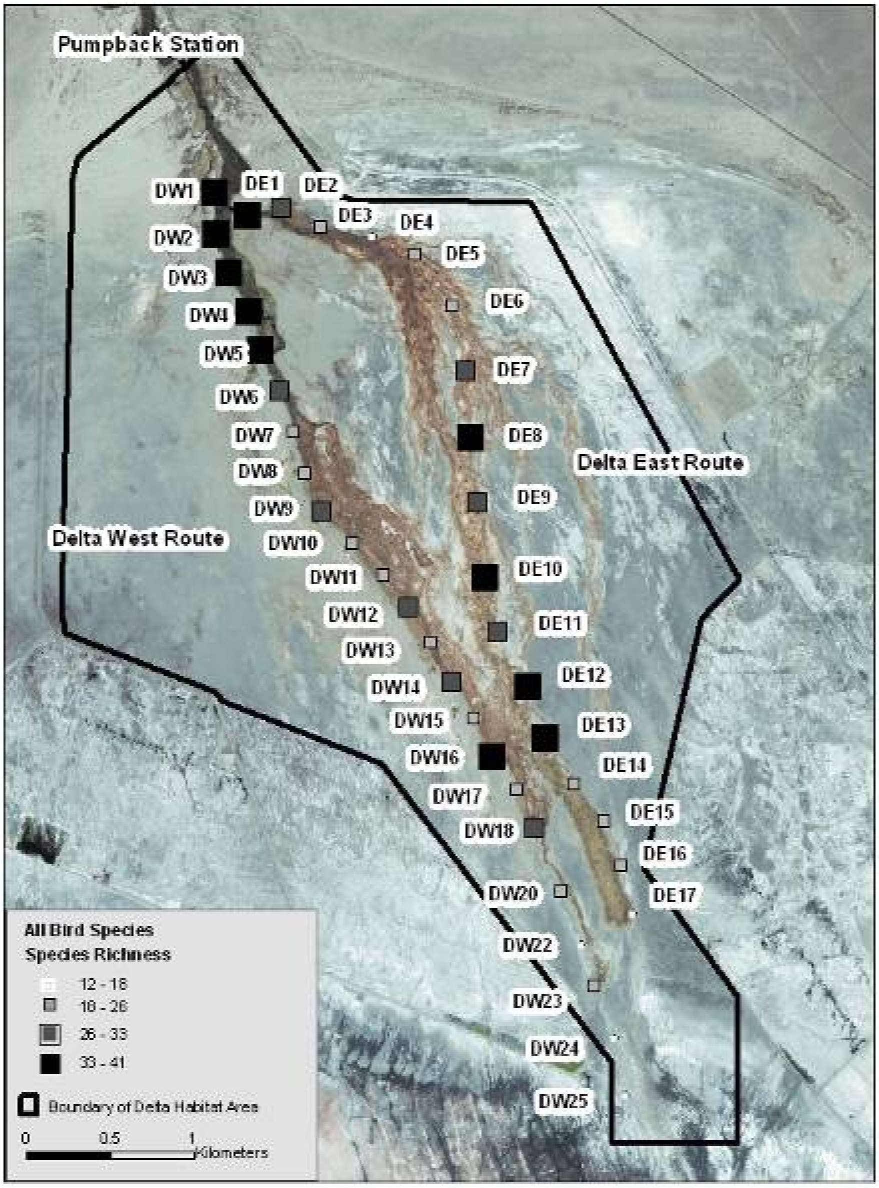
Overall, total bird species richness has generally been highest at the northern end of the DHA where scattered willow trees occur amongst alkali marsh, and secondarily in the area of confluence of the east and west branches (DHA Figure 12). The species richness has also been relatively high at the point DE08, at least in part due to a seasonally flooded area of playa that has attracted several species. Habitat indicator species have been detected throughout the DHA. Habitat indicator species richness has been highest at the northern end of the east branch where a perennial open water pond exists, and at DE08 and DE11 where seasonally flooded areas of playa occur within the wetland vegetation (DHA Figure 13). The area of confluence generally has accounted for most of the total detections (DHA Figure 14). During winter surveys, large groups of ducks or geese have been detected from point DW25. These birds have been at the south end of the Brine Pool transition areas, outside the boundary of the DHA, but whose presence may be influenced by outflow from the DHA. The greatest percentage of habitat indicator species detections has also been near the confluence of the channels as well as at the southern end of the west channel (DHA Figure 15). Along the east side of the west branch, near the confluence are areas that are seasonally flooded, and have attracted the majority of waterfowl seen in the DHA. At the southern end of the west branch, there is an area that lies between the west and lower east branch that is seasonally flooded and receives regular use by shorebirds. Indicator species use recorded for the southern end of the Delta West route, in the transition area, is partly attributable to observations of birds at the northern end of the Brine Pool. Depending on the water level in the Brine Pool, birds may be visible along its northern boundary, outside the established boundaries of the DHA, but in an area influenced by outflow from the Delta to the transition area.

8.11.1. Spring

Throughout all years, use of the DHA has been highest during springtime (Table 12). 90 species have been recorded during spring surveys. A total of 28 habitat indicator species have been detected during spring surveys including 12 in 2002, 22 in 2005, and 17 in 2009 (Table 12). Since only one survey was conducted during spring in 2002, the data is not entirely comparable to that obtained in 2005 and 2009 when four surveys were conducted during spring migration.

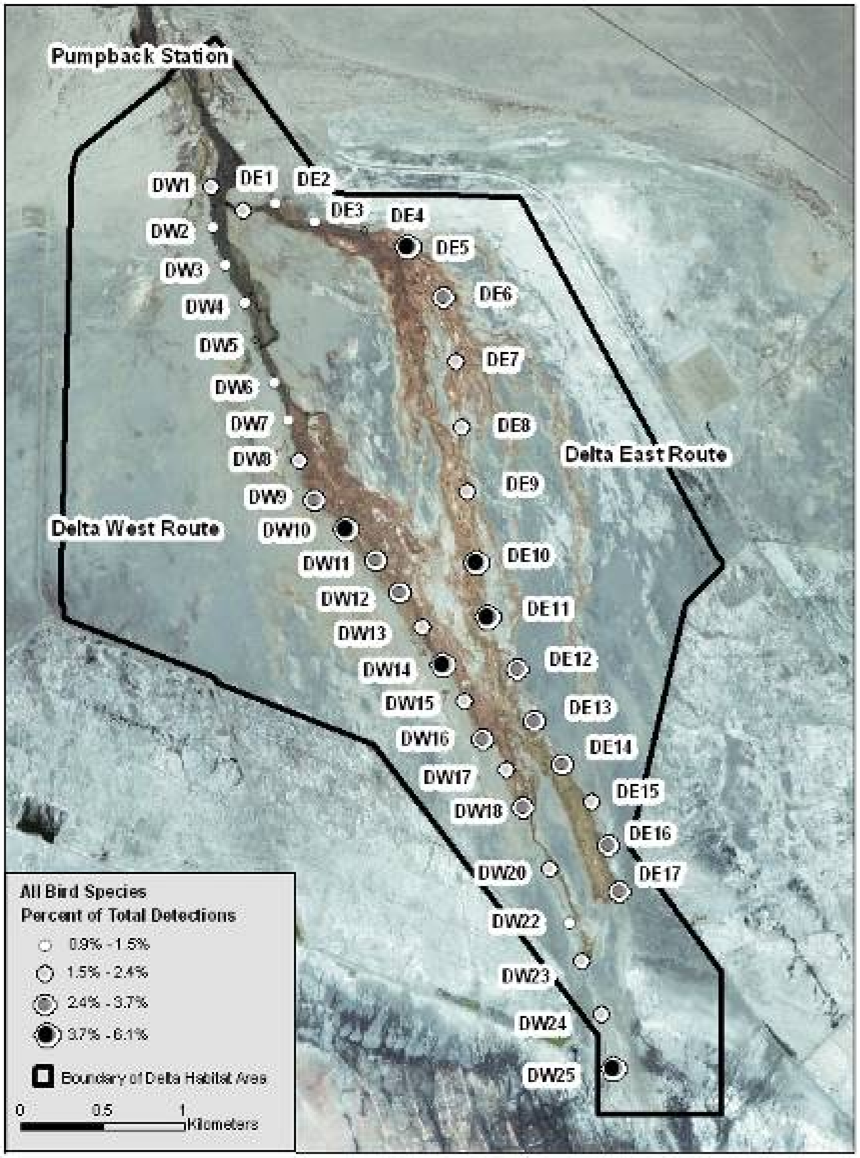
During the spring of 2002, the most abundant species detected were Red-winged Blackbirds, Savannah Sparrows, migrant swifts, and swallows (Table 13). Habitat indicator species comprised approximately 10% of all detections. A total of 12 habitat indicator species were seen with the majority of use of habitat indicator species by Calidrid sandpipers, Mallard, and plover species (Semipalmated Plover and Killdeer). In the spring of 2005, the wet, flooded, and open conditions encountered attracted increased numbers and species richness of waterfowl, wading birds, and shorebirds over 2002 conditions. Red-winged Blackbird, Savannah Sparrow and Marsh Wren were the most abundant species. Habitat indicator species made up a larger proportion of all birds seen in spring 2005 as habitat indicator species comprised 43% of all detections.

The total number of birds detected during each spring 2009 survey was higher than all comparable preproject surveys (Figure 16). There were notable increases in the abundances of the common breeding species and migrant swallows. Habitat indicator species such as rails (both Virginia Rail and Sora) and White-faced Ibis were well above preproject conditions, while fewer waterfowl and shorebirds were detected in 2009 as compared to 2005.

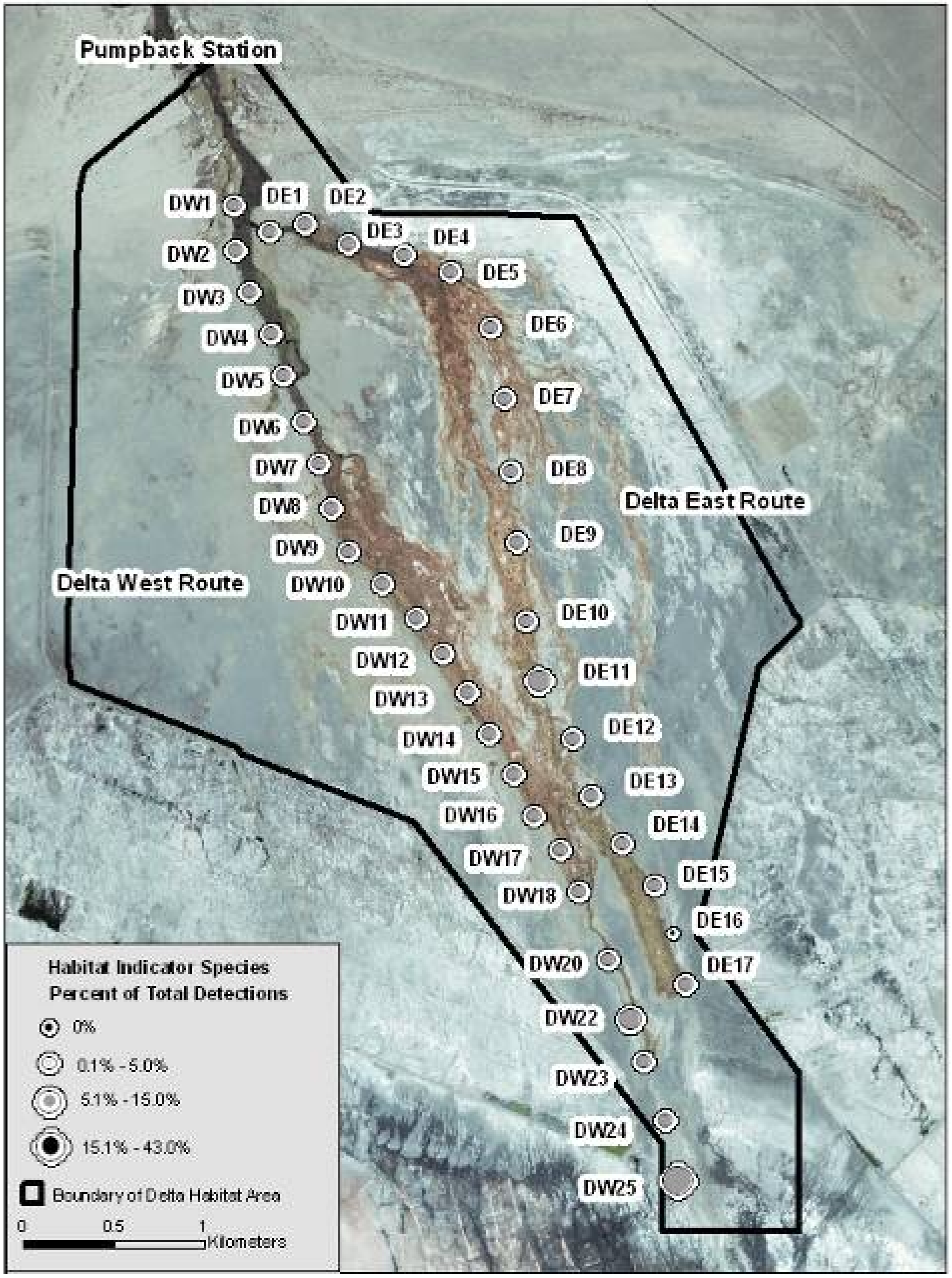


DHA Figure 12. Total Bird Species Richness By Survey Point – All Surveys Combined

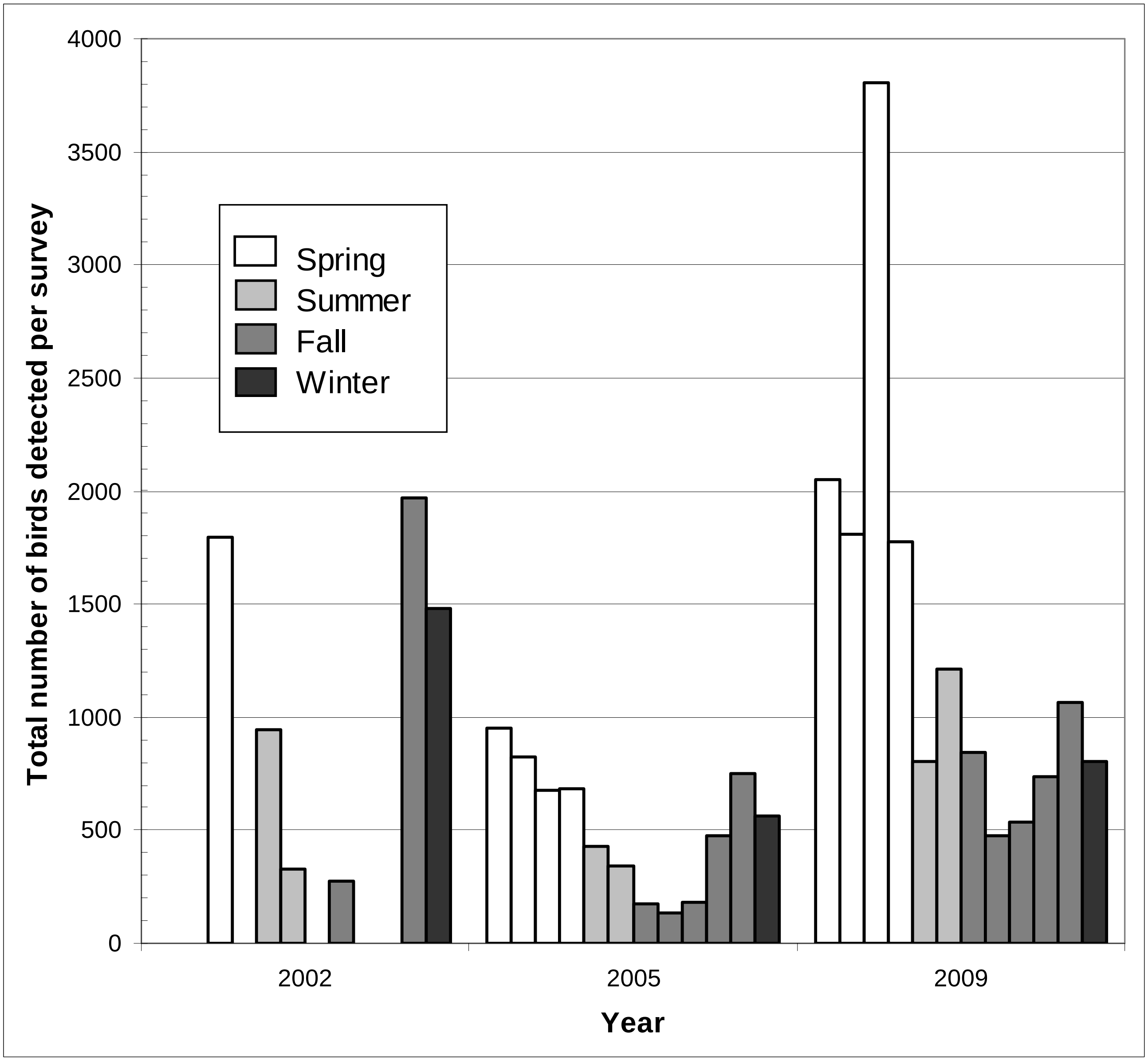
DHA Figure 13. Habitat Indicator Species Richness By Survey Point - All Surveys Combined



DHA Figure 14. The Percent of Total Bird Detections By Survey Point



DHA Figure 15. Percentage of Detections of Habitat Indicator Species by Survey Point



DHA Figure 16. Total Bird Detections by Year and Season

8.11.2. Summer

Breeding has been confirmed for 21 species in the DHA, and is suspected for an additional seven species (DHA Table 14). The 35 other species that have been seen during the summer include late spring or early summer migrants, and local transients. Since 2002, the most abundant breeding species in the DHA have been Red-winged Blackbird, Savannah Sparrow, Yellow-headed Blackbird and Marsh Wren.

Total bird detections during summer indicate an increase in abundance of the overall breeding bird community as compared to preproject conditions. The 2009 data indicate notable increases in the abundances of the four most common breeding species as compared to pre-project conditions. The total detections of other less abundant breeding species such as Loggerhead Shrike, Northern Mockingbird, and Bewick's Wren also increased in 2009 as compared to pre-project data. Three habitat indicator species: Mallard, Virginia Rail, and Sora were also found to be more abundant in 2009. The Least Bittern, a habitat indicator species and California Species of Special Concern, is suspected to breed or have bred in the DHA. In 2002 and 2005, one individual of this species was detected only during the first summer survey. It is not known if this species remained in the area to breed. In 2009, two individuals were detected during both summer surveys. This species was both seen and heard calling during surveys. Due to its continued presence through at least mid-June, it is suspected that Least Bittern likely bred or attempted breeding in the DHA in 2009, which may indicate a positive response to enhanced habitat conditions.

Some bird nests have been found opportunistically during avian surveys. Bird species that have nested in Gooding-red willow habitats of the DHA include Red-tailed Hawk, Mourning Dove, Ash-throated Flycatcher, and European Starling. In alkali marsh, nests of Marsh Wren, and Red-winged and Yellow-headed Blackbirds have been observed, while the breeding activities of Northern Harriers are also in this habitat type. If nesting in the DHA American Bittern, Least Bittern, Sora, and Virginia Rail, are likely to place their nests in alkali marsh. These species typically nest in dense emergent vegetation over water. Bittern nests are typically well above the water, while rail nests may be suspended above water or have their bottom surface in contact with the water. In meadow habitats such as wet meadow and alkali meadow, the predominant breeding species is Savannah Sparrow. In 2009, a Mallard nest was found along the east branch in a dense wet meadow habitat area. Other habitat indicator species which could potentially breed in the DHA such as Long-billed Curlew, and other duck species including Gadwall and Cinnamon Teal also typically nest in dense wet meadow habitats in Owens Valley. Species nesting in meadow habitats are ground-nesting species. In the DHA, tree and shrub-nesting species such as Western Kingbirds and Loggerhead Shrikes are also seen in association with meadow habitats as they may place their nests in saltcedar. While bird species using the DHA may start nesting in March or earlier, the bulk of the breeding activity typically occurs May through June.

8.11.3. Fall

The three most abundant breeding species appear undergo a post-breeding dispersal leading to much fewer bird detections within the project area by early August, when fall surveys commence (Table 15). The ripening seeds of common sunflower (*Helianthus annuus*) by late September and into October attracts flocks of blackbirds again to the area as well as other seed-eating birds such as House Finch, Lesser Goldfinch, and Mourning Dove. Southbound migrant swallows are also typically seen foraging over the DHA.

Marsh Wren, Common Yellowthroat and swallow numbers during fall 2009 were increased as compared to preproject conditions, possibly due to the more wetted conditions within the habitat area. Virginia Rails persisted throughout the fall, whereas they had been virtually absent during fall during preproject surveys. Despite the more wetted conditions during early fall of 2009 as compared to pre-project conditions, the majority of breeding Red-winged Blackbird, Yellow-headed Blackbirds and Savannah Sparrows dispersed from the area following breeding, although more Yellow-headed Blackbirds remained in the area than during any fall pre-project survey. The pulse flow in September flooded areas that were dry during the previous survey two weeks prior. Habitat indicator species seen using the newly flooded areas include Great Egret, Greater Yellowlegs, Long-billed Curlew, and Calidrid sandpipers. The habitat indicator species groups of waterfowl, rails, bitterns and wading birds were more abundant in fall 2009 as compared to preproject survey data.

8.11.4. Winter

Only three winter surveys have been conducted to date – one in January 2003, one in November 2005, and one in November 2009. One additional winter survey is scheduled for the 2009/2010 survey period in January 2010. This schedule of surveys will provide data to compare with previous winter survey efforts. The January 2003 survey detected over 300 ducks and geese as well as wintering shorebirds (Table 16). The ducks and geese were at the very southern end of the Brine Pool transition area, likely outside the boundaries of the DHA. In November 2005, low numbers of birds were present and few habitat indicator species were seen. In November 2009, a flock of 450 unidentified ducks were seen at the southern end of the Brine Pool transition area, outside the boundary of the DHA, but whose presence was likely influenced by the presence of outflow from the DHA.

8.12. Habitat Associations

The total observations by habitat type were summed for all species as well as for each habitat indicator species. The habitat types defined for use in this project and for mapping of Delta area habitats were cross-walked to those used in California Wildlife Habitat Relationship system. Table 17 shows the total number of observations by habitat type and the total number of species associated with each habitat type. The majority of observations for all bird species were in wet alkali meadow and alkali marsh habitats with the most species (85) seen in wet alkali meadow. Approximately equal numbers of species were seen in Gooding-red willow, alkali marsh and dry alkali meadow habitats. Species typically seen in association with wet alkali meadow are Savannah Sparrows, Red-winged and Yellow-headed Blackbirds and migrant aerial insectivores. Blackbirds are most abundant in this habitat type during fall as they feed on the ripening seeds of annual sunflower. Other species including nesting Western Kingbirds and passerine migrants have been seen in wet meadow habitats where tamarisk plants provide vertical structure and nesting and foraging opportunities otherwise lacking in this habitat type. Alkali marsh supports Red-winged and Yellow-headed Blackbird along with Marsh Wren, Common Yellowthroat, rails and bitterns. The Gooding-red willow habitat attracts passerine migrant species, woodpeckers, and nesting Western Kingbird and Mourning Dove. Species typically seen in dry alkali meadow typically include Savannah Sparrow, blackbirds and migrant swallows. Playa habitats are used year round by Horned Lark, and have been used seasonally when flooded, by California Gull and some shorebird species. Shrub habitats including Parry saltbush and dune support Loggerhead Shrike, Savannah Sparrow, and Horned Lark.

Table 18 provides the number of observations of each habitat indicator species by habitat type, as well as the CWHR Suitability index of the habitat by species. The Suitability Index ranges from

0.00-1.00, with a rating of 1.00 indicating a high suitability, 0.66 medium suitability, and 0.33 low suitability of the habitat type. No modeling information is available for a particular species in that habitat if a habitat is listed as “Not Rated”. These are generally habitats that are not used by the species. Of all observations of species by habitat in the DHA, only a few species/habitat associations are “Not Rated”. CWHR will only generate suitability values for the species level. Therefore no suitability value is listed for “PEEX”, since this code refers to a *Calidris* sandpiper, not identified to species.

The majority of observations of habitat indicator species were in playa/brine pool, alkali marsh, wet meadow and water. More habitat indicator species have been seen in association with alkali marsh than other habitat types. Waterfowl species have been primarily associated with open water areas, rails/bitterns/night herons with alkali marsh, and shorebirds with wet alkali meadow. For the most part, the habitat indicator species were observed in habitats modeled under CWHR, indicating the usefulness of the model.

8.13. Summary

There has been yearly, seasonal, and spatial variation in birds observed in the Delta Habitat Area. Yearly variations can be explained in part by local weather variations, and by changes induced by implementation of the Lower Owens River Project. Overall bird use of the DHA since implementation of the LORP has increased. Passerine and waterbird species appear to have benefited from changes that have occurred to date since implementation. The apparent qualitative changes in habitat conditions have affected the different groups of habitat indicator species differently. A positive response has been seen from habitat indicator species associated with alkali marsh habitats – namely rails and bitterns. Secondarily, long-legged wading species such as White-faced Ibis and egrets that use wet meadow habitats also appear to be using the DHA more frequently. Waterfowl use of the area is likely more consistent through the summer and fall as compared to preproject conditions, due to increased water availability, however spring use was less in 2009 as compared to 2005. Regions of the DHA used by waterfowl in 2005 appeared more vegetated in 2009, with fewer shallow open water areas. Any changes in use by shorebirds as compared to preproject conditions are less apparent.

The highest species richness was seen in wet meadow, Gooding-red willow, alkali marsh and dry alkali meadow. Wet and dry alkali meadow habitats comprise the vast majority of vegetated areas within the DHA. Gooding-red willow habitats, although not extensive or expected to be in the Delta, do provide vertical structural diversity to the wetland habitats of the Delta. Habitat indicator species were most often associated with alkali marsh, wet alkali meadow, water and playa habitats. Of these four habitats, open water areas are the most limited within the DHA.

Variations in the use of the DHA are also likely influenced by changes occurring in the surrounding Dust Control project area.

8.14. Adaptive Management Recommendations

In addition to the MOU goal to enhance and maintain the DHA, adjustments to the Delta flows (within the 6 to 9 cfs annual average range) are based upon the following monitoring triggers:

(1) A decrease of 10% or more during any 3-year period (i.e., the present year and the previous two years) from the "Delta conditions" (total acreage of vegetated wetlands plus water) as estimated from aerial or satellite imagery or other appropriate methods

(2) A 20% or greater reduction in habitat suitability index (aerial extent and habitat quality) as measured at 5-year intervals after the commencement of releases of base flows to the Delta

(3) A reduction in base flows to the Delta will be considered if monitoring indicates an increase of 10 percent or more in area during any 3-year period from the "Delta conditions" and an increase of 20 percent or more in habitat suitability index as measured at 5-year intervals.

The current management of the Delta includes a base flow of no less than 3 cfs with an annual average of 6 to 9 cfs, four pulse flows of 20 to 30 cfs and varying duration, and additional inflow related to seasonal habitat flows above and beyond the capacity of the pumpback station. Pulse flows are intended to be released for short periods of time to increase the distribution and amount of water in the Delta to benefit vegetation growth periods and indicator species. Pulse flows may be modified as part of adaptive management based upon the monitoring triggers described above.

Analysis of current conditions shows that the primary changes in the Delta since LORP implementation is the conversion of about 196 acres of Saltgrass association habitat to Alkali Marsh. The number of acres of vegetated wetlands decreased by 40, a less than 5% reduction from 2005 levels, which is within an expected mapping and conversion error range. Overall, the DHA has become dominated by more hydrophilic vegetation than 2005, with roughly the same extent. Thus, the minimum trigger of vegetation change has not been exceeded.

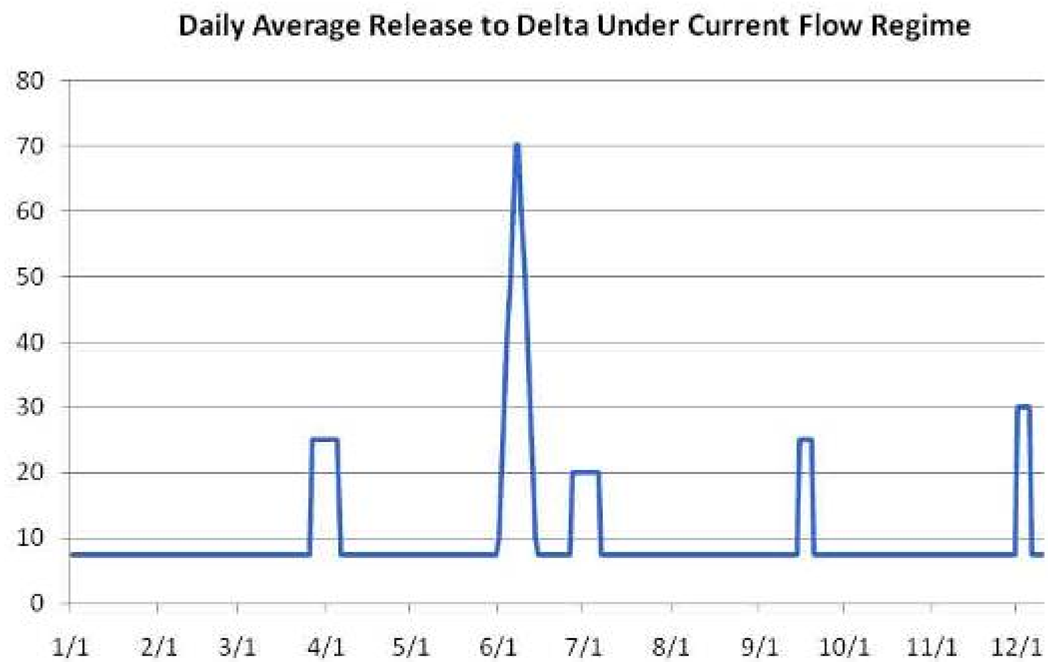
Habitat diversity increased between 2005 and 2008, due to increased evenness of vegetation association acreages. Nevertheless, concerns include the trend toward increasing tules and cattails (alkali marsh) and monoculture dominated habitat, and a possible downward trend in wetland area compared to the high measured in 1996. The change in total wetland area over time (831 acres in 2000, 755 acres in 2005, 645 acres in 2006, 715 acres in 2008) may be due to natural variability rather than a trend resulting from management actions. Satellite and aerial images and the associated mapping are displayed in Appendix B. Whether plant diversity declines as a tule monoculture develops will require additional time to determine. In the meantime, until the next Delta monitoring year, the planned pulse flows should be followed.

As described previously, a scheduled pulse was released in September 2009. The next pulse should be release in mid-December and the planned release schedule followed to the next monitoring year:

- Period 1: Flows of 25 cfs will be released for 10 days at the on-set of the plant-growing season (late-March to mid-April) to replenish the freshwater lens prior to plant emergence from dormancy. This pulse flow is also expected to enhance saltgrass production (the dominant species in alkali meadows) because it can utilize water more effectively and efficiently at this time. This pulse flow will also enhance foraging areas along the vegetation-playa-water interface to attract migratory species.
- Period 2: Flows of 20 cfs will be released for 10 days in the late spring to mid-summer (late-June to early-July) when evapotranspiration rates are high. This pulse flow will help ensure that adequate water is available to sustain plants during the critical summer period and will provide direct and indirect benefits to invertebrates and wildlife.
- Period 3: Flows will be increased to 25 cfs for 10 days in September during the late growing season to enhance wetland habitat for early migrants.
- Period 4: A late fall – early winter (November – December) pulse of 30 cfs for 5 days will be released to benefit wildlife and to recharge the freshwater lens.

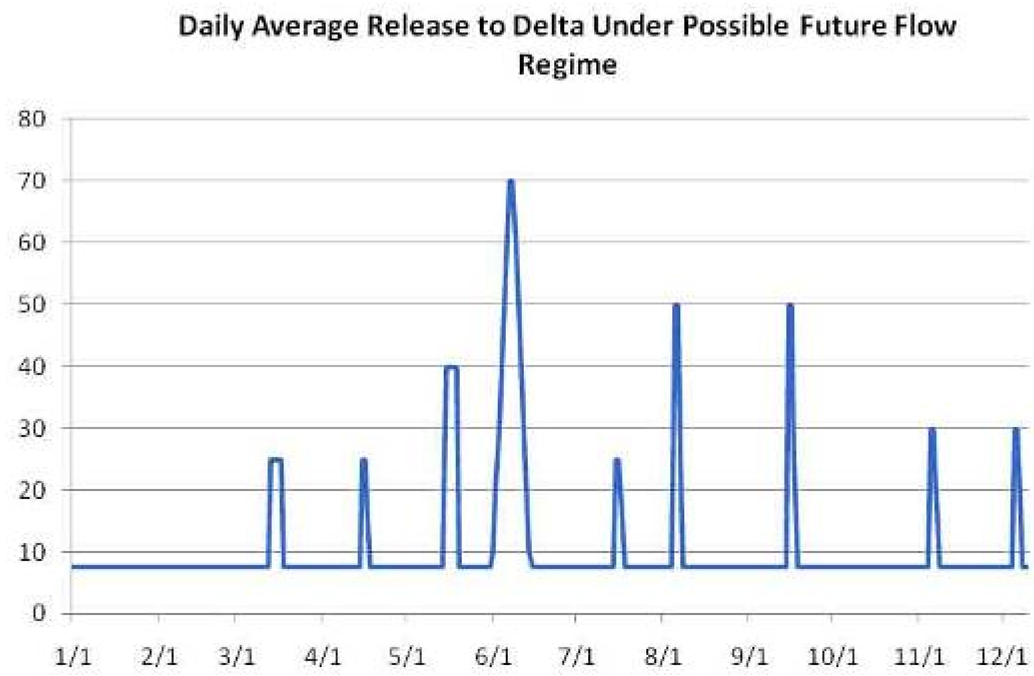
The flow regime for the Delta has undergone significant changes in recent years. In the event results from the next monitoring period indicate a significant decline in total wetland area or a significant loss of diversity, adaptive management may include a different schedule and distribution of the pulse flows.

The existing flow regime for the Delta contains four pulse flows and the seasonal habitat flow (DHA Figure 17). Using the same volume of water as the current flow regime, pulse flow magnitude and frequency could be increased with shorter duration to wet more area of the Delta and retain more of the inflow (DHA Figure 18). The purpose would be to meet seasonally changing conditions such as evapo-transpiration, winter gain water, and groundwater decline. The possible flow regime is just an example of how pulse flows can be modified if necessary to meet the MOU goals to enhance and maintain the Delta. However, until it can be shown that the current pulse flow plan cannot achieve all of the MOU goals, the adaptive management recommendation is to stay the course.



For this conceptualized representation of the Delta hydrograph for 2010, only releases are represented (the influence of precipitation and "gain water" are not presented), with a year round base flow of 7.5 cfs and a habitat flow peaking at 70 cfs.

DHA Figure 17. Current DHA Flow Regime



For this conceptualized representation of the Delta hydrograph, only releases are represented (the influence of precipitation and "gain water" are not presented), with a year round base flow of 7.5 cfs and a habitat flow peaking at 70 cfs.

DHA Figure 18. Possible Future DHA Flow Regime

DHA Table 12. Seasonal Use of DHA by Habitat Indicator Species and Non-habitat Indicator Species By Survey Year

Seasonal summary values are total individuals recorded per season per year.

Spring		**2002**	**2005**	**2009**
Habitat Indicator Species	Waterfowl and Grebes	51	628	250
	Rails, bitterns and wading birds	18	55	306
	Shorebirds	103	273	131
	Total HIS	172	956	687
Non-Habitat Indicator Species		1623	2175	8754

Summer		**2002**	**2005**	**2009**
Habitat Indicator Species	Waterfowl and Grebes	10	8	33
	Rails, bitterns and wading birds	15	3	37
	Shorebirds	4	8	10
	Total HIS	29	19	80
Non-Habitat Indicator Species		1249	755	1935

Fall		**2002**	**2005**	**2009**
Habitat Indicator Species	Waterfowl and Grebes	10	2	42
	Rails, bitterns and wading birds	9	31	70
	Shorebirds	37	2	44
	Total HIS	56	35	156
Non-Habitat Indicator Species		2190	1677	3495

Winter		**2002**	**2005**	**2009**
Habitat Indicator Species	Waterfowl and Grebes	304	6	452
	Rails, bitterns and wading birds	0	2	19
	Shorebirds	113	1	1
	Total HIS	417	9	472
Non-Habitat Indicator Species		1061	555	333

Total Habitat Indicator Species	**2002**	**2005**	**2009**
Spring	12	22	17
Summer	9	6	13
Fall	12	6	15
Winter	4	4	8

DHA Table 13. DHA Bird Data for Spring Surveys

Spring	Common Name	4/26/2002	4/1/2005	4/14/2005	4/29/2005	5/13/2005	Total 2005	3/27/2009	4/10/2009	4/27/2009	5/11/2009	Total 2009	Total all years
Habitat Indicator Species	Gadwall	5	50	2	8		60				3	3	68
	American Wigeon		7				7					0	7
	Mallard	41	201	12	17	30	260	127	39	13	65	244	545
	Blue-winged Teal		1				1					0	1
	Cinnamon Teal	4	176	15	8	4	203	2				2	209
	Northern Pintail	1	55			1	56					0	57
	Green-winged Teal		41				41					0	41
	Pied-billed Grebe						0			1		1	1
	American Bittern	3		1	2	8	11	1			11	12	26
	Least Bittern						0				1	1	1
	Great Blue Heron						0	2	3			5	5
	Great Egret				3	1	4				4	4	8
	Snowy Egret				2	11	13			7	26	33	46
	Black-crowned Night-Heron			1			1	3	1			4	5
	White-faced Ibis						0			12	161	173	173
	Virginia Rail	5			3	2	5	17	17	5	17	56	66
	Sora	10		3	8	8	19		11	2	5	18	47
	American Coot				1	1	2					0	2
	Semipalmated Plover	20					0					0	20
	Killdeer	13	7	3	2	6	18	1	1	1		3	34
	Black-necked Stilt					2	2					0	2
	American Avocet					10	10	75			1	76	86
	Greater Yellowlegs	8	1	1			2					0	10
	Long-billed Curlew		1				1					0	1
	Western Sandpiper	26					0					0	26
	Least Sandpiper	18		188	35		223		3			3	244
	Calidris sp.	18					0		40			40	58
	Short-billed Dowitcher		12				12					0	12
	Wilson's Snipe		1	2	2		5	4	3	2		9	14
Non-Habitat Indictor Species	Northern Harrier	2	2	2	1	2	7	6	4	4	1	15	24
	Cooper's Hawk						0			1		1	1
	Red-tailed Hawk	1			2		2	4	2		4	10	13
	American Kestrel	2			1		1			1		1	4
	Peregrine Falcon						0	1		1	2	4	4
	Prairie Falcon		1	1		1	3					0	3
	California Gull		10		30		40	230	17	400	233	880	920
	Mourning Dove	7			14	10	24	2	4	8	11	25	56
	Great Horned Owl				1		1					0	1
	Vaux's Swift	9					0					0	9
	White-throated Swift	162					0	11			1	12	174
	Unidentified Swift sp.	1					0					0	1
	Black-chinned Hummingbird						0				2	2	2
	Unidentified Hummingbird					1	1					0	1
	Belted Kingfisher				1		1					0	1
	Ladder-backed Woodpecker			2		2	4					0	4
	Northern Flicker						0	3				3	3
	Unidentified Woodpecker sp.	1					0					0	1
	Olive-sided Flycatcher					2	2					0	2
	Western Wood-Pewee					4	4				1	1	5
	Willow Flycatcher	2					0					0	2
	Gray Flycatcher	4			4	4	8					0	12
	Dusky Flycatcher				2		2			1		1	3
	Unidentified Empidonax sp.	4				1	1					0	5
	Black Phoebe						0	2	3			5	5
	Say's Phoebe	3					0	1	1			2	5
	Ash-throated Flycatcher				3	7	10			3	1	4	14
	Western Kingbird	17	2	2	5	17	26		1	29	41	71	114
	Loggerhead Shrike	4	2		3	12	17	4	2	2	6	14	35
	Warbling Vireo	1					0					0	1
	Common Raven	24	2	2	2	1	7	10	4	4	5	23	54
	Horned Lark	42					0					0	42
	Tree Swallow	6		18	2		20	462	315	673	1	1451	1477
	Violet-green Swallow	17		13	2		15		9	1	1	11	43
	Northern Rough-winged Swallow	26			4	5	9	2	9	6	1	18	53
	Bank Swallow						0			5	1	6	6
	Cliff Swallow	147		12	24	1	37		8	37		45	229
	Barn Swallow	22		69	66	6	141	109	143	720	19	991	1154
	Unidentified Swallow	256		5			5	255	57	220	4	536	797
	Cactus Wren			1	2	1	4					0	4
	Bewick's Wren			1	2	1	4		1	1	3	5	9
	Marsh Wren	65	22	29	39	37	127	110	106	107	91	414	606
	Ruby-crowned Kinglet	2		2			2					0	4
	Blue-gray Gnatcatcher				2		2		1		3	4	6
	Northern Mockingbird	1			2	3	5	1	5	6	13	25	31
	European Starling		1	2	7	7	17	2	3		2	7	24
	American Pipit	9	18	5	16		39	39	32			71	119
	Phainopepla					1	1					0	1
	Orange-crowned Warbler	1			6		6			1	1	2	9
	Yellow Warbler	5				3	3				5	5	13
	Yellow-rumped Warbler	29		24	6		30		4	3		7	66
	Townsend's Warbler				1		1					0	1
	MacGillivray's Warbler						0				3	3	3
	Common Yellowthroat	34	2	10	13	25	50		4	12	29	45	129
	Wilson's Warbler	4			5	4	9			7	17	24	37
	Black-throated Sparrow						0			1		1	1
	Savannah Sparrow	164	55	87	105	122	369	180	240	408	270	1098	1631
	Song Sparrow	13	11	10	11	13	45	5	7	4	7	23	81
	White-crowned Sparrow	6		12			12				7	7	25
	Red-winged Blackbird	436	265	278	166	129	838	269	511	826	375	1981	3255
	Western Meadowlark	2			1	1	2	20	3	6	8	37	41
	Yellow-headed Blackbird	59	3	7	29	156	195	22	196	264	283	765	1019
	Brewer's Blackbird						0	67			20	87	87
	Great-tailed Grackle						0				1	1	1
	Brown-headed Cowbird	33			5	18	23		2		7	9	65
	Hooded Oriole					1	1					0	1
	Bullock's Oriole				2		2				1	1	3
Survey and Seasonal Totals		1795	949	822	678	682	3131	2049	1812	3805	1775	9441	14367

DHA Table 14. DHA Bird Data for Summer Surveys

Breeding status: C = confirmed breeder, S = suspected breeder; N = no evidence of breeding in DHA

Summer	Breeding Status	Common Name	5/24/2002	6/20/2002	2002 Totals	6/2/2005	6/24/2005	2005 Totals	6/2/2009	6/15/2009	2009 Totals	Total all years
Habitat Indicator Species	N	Gadwall			0			0		1	1	1
	C	Mallard	10		10	1	3	4	1	29	30	44
	S	Cinnamon Teal			0	4		4	2		2	6
	S	American Bittern		3	3			0	3	3	6	9
	S	Least Bittern	1		1	1		1	2	2	4	6
	N	Great Blue Heron		3	3		1	1		1	1	5
	N	Great Egret	1		1			0	1		1	2
	N	Black-crowned Night-Heron	1		1			0		3	3	4
	S	Virginia Rail	5	1	6			0	4	11	15	21
	S	Sora			0	1		1		7	7	8
	C	Killdeer	3		3	8		8	1	3	4	15
	N	American Avocet			0			0	4	1	5	5
	N	Long-billed Curlew	1		1			0			0	1
	N	Wilson's Phalarope			0			0	1		1	1
Non-Habitat Indictor Species	C	Northern Harrier	1	3	4		1	1	4	4	8	13
	C	Red-tailed Hawk			0	1		1	5	2	7	8
	N	American Kestrel	1		1		1	1			0	2
	N	Prairie Falcon	1		1			0			0	1
	C	Mourning Dove	5	13	18	9	9	18	11	12	23	59
	C	Great Horned Owl		1	1			0			0	1
	N	Lesser Nighthawk			0		1	1			0	1
	N	White-throated Swift	231		231			0	2	1	3	234
	C	Ladder-backed Woodpecker			0	2	1	3			0	3
	N	Nuttall's Woodpecker	2	1	3			0			0	3
	N	Unidentified Woodpecker sp.		1	1			0			0	1
	N	Western Wood-Pewee	9		9			0	3	1	4	13
	N	Willow Flycatcher			0		1	1			0	1
	N	Gray Flycatcher	1		1	1		1			0	2
	N	Unidentified Empidonax sp.	3		3			0			0	3
	S	Black Phoebe	1	1	2			0			0	2
	S	Say's Phoebe	2	1	3		2	2		5	5	10
	C	Ash-throated Flycatcher	5	3	8	4	5	9	3	6	9	26
	C	Western Kingbird	57	23	80	11	20	31	32	66	98	209
	C	Loggerhead Shrike	2	11	13	4	12	16	12	13	25	54
	N	Black-billed Magpie		2	2			0			0	2
	N	Common Raven	10	2	12		1	1	4	13	17	30
	N	Horned Lark	14	12	26			0			0	26
	N	Violet-green Swallow	6		6			0	1		1	7
	N	Northern Rough-winged Swallow	7	1	8	1	26	27			0	35
	N	Cliff Swallow	14	1	15		15	15		2	2	32
	N	Barn Swallow	33	7	40		3	3			0	43
	N	Cactus Wren			0	1	1	2			0	2
	C	Bewick's Wren			0	2		2	3	8	11	13
	C	Marsh Wren	61	25	86	25	12	37	126	104	230	353
	N	Blue-gray Gnatcatcher	1		1			0			0	1
	N	Hermit Thrush	1		1			0			0	1
	C	Northern Mockingbird	1	4	5	5	4	9	13	16	29	43
	N	Sage Thrasher			0			0	1		1	1
	N	Le Conte's Thrasher			0			0		1	1	1
	C	European Starling			0	11	11	22		2	2	24
	N	Yellow Warbler			0			0	2		2	2
	N	Yellow-rumped Warbler	1		1			0			0	1
	N	MacGillivray's Warbler	1		1			0	1		1	2
	C	Common Yellowthroat	15	27	42	32	23	55	19	26	45	142
	N	Wilson's Warbler	16	1	17			0	2		2	19
	N	Chipping Sparrow	1		1			0			0	1
	C	Savannah Sparrow	138	67	205	113	90	203	258	274	532	940
	C	Song Sparrow	12	14	26	12	9	21	8	13	21	68
	N	Western Tanager	20		20			0			0	20
	N	Lazuli Bunting	1		1			0			0	1
	C	Red-winged Blackbird	151	77	228	134	74	208	166	279	445	881
	S	Western Meadowlark	3		3			0	4	1	5	8
	C	Yellow-headed Blackbird	81	11	92	32		32	90	289	379	503
	C	Great-tailed Grackle	6		6			0	7	5	12	18
	C	Brown-headed Cowbird	10	15	25	9	17	26	5	6	11	62
	N	House Finch			0	7		7		4	4	11
		Survey and Seasonal Totals	947	331	1278	431	343	774	801	1214	2015	4067

DHA Table 15. DHA Bird Data for Fall Surveys

Fall	Common Name	8/16/2002	10/11/2002	Total 2002	8/4/2005	8/24/2005	9/12/2005	9/26/2005	10/12/2005	Total 2005	8/4/2009	8/18/2009	9/1/2009	9/15/2009	10/6/2009	Total 2009	Total all years
Habitat Indicator Species	Mallard	1		1						0	1	5	3	5		14	15
	Blue-winged Teal			0				1		1						0	1
	Cinnamon Teal			0			1			1						0	1
	Unidentified Teal		6	6						0		1		15		16	22
	Northern Pintail	2		2						0					9	9	11
	Green-winged Teal														3	3	3
	Pied-billed Grebe		1	1						0						0	1
	American White Pelican	1		1						0						0	1
	American Bittern			0						0		1	1	1		3	3
	Great Blue Heron	1		1						0	1			1		2	3
	Great Egret		1	1						0	1			5		6	7
	Black-crowned Night-Heron			0	22	1				23						0	23
	White-faced Ibis			0						0	8					8	8
	Virginia Rail		1	1						0	8	12	18	2	2	42	43
	Sora		4	4		1	1	2		4	1		1	2	1	5	13
	American Coot		1	1					4	4			1		3	4	9
	Killdeer	1		1	1			1		2		3		2	6	11	14
	Greater Yellowlegs			0						0				5		5	5
	Long-billed Curlew			0						0				13	6	19	19
	Western Sandpiper			0						0				1		1	1
	Least Sandpiper		10	10						0				1	2	3	13
	Calidris sp.			0						0				5		5	5
	Unidentified Shorebird species	25		25						0						0	25
	Wilson's Snipe		1	1						0						0	1
	Northern Harrier	1	9	10	2	1		2	3	8	7	4	4	11	8	34	52
Non-Habitat Indictor Species	Cooper's Hawk			0						0			1		1	2	2
	Red-tailed Hawk		1	1	1	1	1			3		1		2	1	4	8
	Ferruginous Hawk			0					1	1						0	1
	American Kestrel	2	1	3		3	2			5	2	2	2	9		15	23
	Peregrine Falcon			0						0				2	1	3	3
	Prairie Falcon		1	1	1	1				2		1		1	1	3	6
	California Gull			0						0	51			1		52	52
	Mourning Dove	17	6	23	8	19	4	12	2	45	8	3	20	14	2	47	115
	Great Horned Owl	5	1	6						0			1		1	2	8
	Lesser Nighthawk	1		1	3					3						0	4
	Common Nighthawk			0						0	1					1	1
	White-throated Swift			0						0	5				1	6	6
	Black-chinned Hummingbird			0						0			1			1	1
	Rufous Hummingbird			0		1				1						0	1
	Unidentified Hummingbird	2		2		1				1		1				1	4
	Belted Kingfisher			0		1				1						0	1
	Ladder-backed Woodpecker			0	1	1	2	1		5				1		1	6
	Nuttall's Woodpecker	5	2	7	2					2			1			1	10
	Northern Flicker		1	1				1	2	3					6	6	10
	Western Wood-Pewee	1		1			2			2						0	3
	Willow Flycatcher			0						0		2	1			3	3
	Gray Flycatcher			0	1					1						0	1
	Unidentified Empidonax sp.	1		1						0				1		1	2
	Black Phoebe	3		3	2	3	2	2	2	11		1	1	1	1	4	18
	Say's Phoebe	3	4	7	3	5	5		1	14	2		8	2	5	17	38
	Ash-throated Flycatcher	1		1	3					3				1		1	5
	Western Kingbird	20		20	22	11				33	20	11	3			34	87
	Loggerhead Shrike	9	4	13	19	9	4	4		36	12	10	12	8	11	53	102
	Warbling Vireo			0						0			1			1	1
	Common Raven	4	10	14	1		1		2	4	3	7	3	8	8	29	47
	Horned Lark	2	23	25	4	2	3	3	8	20	2	18	54	35	12	121	166
	Tree Swallow	43		43						0	83	19	3		7	112	155
	Violet-green Swallow	4		4	2					2	33					33	39
	Northern Rough-winged Swallow	21		21	4	6				10	32	7	2			41	72
	Bank Swallow	2		2	1	3				4	35	4	3			42	48
	Cliff Swallow	6		6		6				6	40	18	1			59	71
	Barn Swallow	28	75	103	36	8		159	50	253	31	32	72	230	177	542	898
	Unidentified Swallow	21		21						0	191	23	41	5		260	281
	Cactus Wren			0				1		1						0	1
	Bewick's Wren		3	3	2		1	2	1	6			2	1	1	4	13
	Marsh Wren	8	39	47	7	10	9	22	14	62	51	64	59	55	43	272	381
	Ruby-crowned Kinglet		1	1					2	2					1	1	4
	Blue-gray Gnatcatcher	2		2						0		1	2	5	1	9	11
	Hermit Thrush		2	2						0						0	2
	Northern Mockingbird			0	2	1			1	4						0	4
	Sage Thrasher			0						0				2		2	2
	Le Conte's Thrasher			0		1		1		2					2	2	4
	European Starling			0					1	1						0	1
	American Pipit		23	23				6		6					1	1	30
	Cedar Waxwing			0			2			2					1	1	3
	Orange-crowned Warbler		1	1		4	20	14	2	40			6	5	5	16	57
	Nashville Warbler	1		1						0			2			2	3
	Yellow Warbler			0			4			4		9	4	8		21	25
	Yellow-rumped Warbler		111	111				5	21	26					22	22	159
	Black-throated Gray Warbler			0						0			1		1	2	2
	MacGillivray's Warbler			0			2			2		1	2			3	5
	Common Yellowthroat	4		4	5	6	8	7		26	14	22	22	13	7	78	108
	Wilson's Warbler			0		1	1			2			3			3	5
	Spotted Towhee														1	1	1
	Chipping Sparrow	3		3						0						0	3
	Brewer's Sparrow	1		1			8			8			1	9		10	19
	Vesper Sparrow			0						0				1		1	1
	Sage Sparrow			0			5		3	8					3	3	11
	Savannah Sparrow	3	111	114	13	7	26	30	41	117	31	25	36	45	65	202	433
	Fox Sparrow		1	1						0						0	1
	Song Sparrow	2	37	39	2	3	10	12	19	46	7	17	18	16	18	76	161
	Lincoln's Sparrow		2	2				2	3	5					1	1	8
	White-crowned Sparrow		34	34				2	1	3				1	17	18	55
	Chestnut-collared Longspur			0					5	5						0	5
	Western Tanager	1		1						0			3	4		7	8
	Lazuli Bunting			0		1				1			3			3	4
	Red-winged Blackbird	2	1106	1108	6	7	31	160	506	710	53	105	93	160	524	935	2753
	Western Meadowlark	5	46	51			5	1	9	15			7	1	46	54	120
	Yellow-headed Blackbird			0						0	59	29	10	10	1	109	109
	Brewer's Blackbird		211	211						0					1	1	212
	Great-tailed Grackle			0						0	5					5	5
	Brown-headed Cowbird	6	1	7		2			2	4	43	9				52	63
	Bullock's Oriole	2		2		1				1	2	6	1			9	12
	House Finch		40	40		3	8	16	4	31				3	20	23	94
	Pine Siskin			0					2	2						0	2
	Lesser Goldfinch		41	41			13	6	36	55			2	7	5	14	110
	American Goldfinch			0					1	1						0	1
	Survey and Seasonal Totals	273	1973	2246	176	131	181	475	749	1712	843	474	536	736	1062	3651	7609

DHA Table 16. DHA Bird Data for Winter Surveys

Winter	Common Name	1/30/2003	11/16/2005	11/17/2009	Total all years
Habitat Indicator Species	Snow Goose	200		2	202
	Gadwall		6		6
	Mallard	4			4
	Unidentified Teal	100		450	550
	American Bittern			1	1
	Great Blue Heron			1	1
	Virginia Rail			2	2
	Sora			1	1
	American Coot		1	14	15
	Sandhill Crane		1		1
	Killdeer	62			62
	Greater Yellowlegs	51			51
	Least Sandpiper		1		1
	Wilson's Snipe			1	1
Non-Habitat Indictor Species	California Quail		9		9
	Northern Harrier	2	5	6	13
	Red-tailed Hawk	1	3	1	5
	Ferruginous Hawk			1	1
	American Kestrel			2	2
	Merlin	1			1
	Prairie Falcon	1	1		2
	Great Horned Owl			1	1
	Northern Flicker		3	6	9
	Unidentified Woodpecker sp.	1			1
	Black Phoebe	1	3		4
	Say's Phoebe		5	5	10
	Loggerhead Shrike	9	6	5	20
	Black-billed Magpie		1		1
	Common Raven	10	9	18	37
	Horned Lark	33	33	20	86
	Tree Swallow	2			2
	Bewick's Wren		3	3	6
	Marsh Wren	38	26	110	174
	Mountain Bluebird			3	3
	Le Conte's Thrasher		2	1	3
	European Starling	22	6	18	46
	American Pipit	22	11		33
	Yellow-rumped Warbler		1		1
	Sage Sparrow			4	4
	Savannah Sparrow	65	149	41	255
	Song Sparrow	23	14	29	66
	White-crowned Sparrow		1		1
	Red-winged Blackbird	432	233	14	679
	Western Meadowlark	73	8	16	97
	Brewer's Blackbird	325		12	337
	House Finch			2	2
	American Goldfinch		23		23
	Survey and Seasonal Totals	1478	564	805	2847

DHA Table 17. Total Observations and Total Species Seen Using Each Habitat Type

Delta Habitat Type	CWHR Habitat Type	#Obs	#Species
Playa/Brine Pool	Lacustrine	2101	33
Water	Riverine	770	31
Gooding Red Willow	Desert Riparian	1252	69
Alkali Marsh	Freshwater Emergent Wetland	8953	66
Wet Alkali Meadow	Wet Meadow	9717	85
Dry Alkali Meadow	Perennial Grassland	4356	67
Dune	Alkali Desert Scrub	519	47
Nevada Saltbush/Rabbitbrush	Alkali Desert Scrub	32	8
Parry Saltbush	Alkali Desert Scrub	131	29

DHA Table 18. Habitat Indicator Species Use of Delta Habitats and California Wildlife Habitat Relationships Suitability of Habitats

Delta Habitat Type	CWHR Habitat Type	Species	#Obs	CHWR Suitability
Playa/Brine Pool	**Lacustrine**	MALL	23	0.55
		SNGO	200	0.34
		AMAV	14	0.61
		BNST	2	0.44
		GRYE	3	0.38
		KILL	5	0.75
		LBCU	14	0.59
		LESA	21	0.60
		PEEX	54	
		SNEG	1	0.42
		WESA	27	0.59
		WFIB	8	0.31
Total Observations: Playa/Lacustrine			372	
Alkali Marsh	**Freshwater Emergent Wetland**	CITE	28	0.94
		GADW	7	0.67
		GWTE	3	0.72
		MALL	211	1.00
		NOPI	4	0.78
		NSHO	8	0.94
		AMAV	77	0.50
		AMBI	33	0.71
		AMCO	3	0.92
		BCNH	17	0.86
		GBHE	9	0.33
		GREG	4	0.22
		GRYE	1	0.44
		KILL	8	0.48
		LBCU	1	0.61
		LEBI	6	0.57
		LESA	27	0.61
		SNEG	17	0.78
		SORA	57	0.83
		VIRA	122	0.83
		WFIB	80	0.61
		WIPH	1	0.76
		WISN	6	0.83
Total Observations: Alkali Marsh/Freshwater Emergent Wetland			730	
Wet Alkali Meadow	**Wet Meadow**	SNGO	2	0.58
		CITE	73	0.22
		GADW	2	0.50
		MALL	89	0.89
		NOPI	6	0.89
		AMBI	4	Not Rated
		AMCO	1	0.44
		GREG	7	0.44
		GRYE	55	0.44
		KILL	32	0.81
		LBCU	4	0.89
		LESA	206	0.50
		PEEX	25	
		SBDO	12	0.42
		SNEG	25	0.40
		SORA	8	0.83
		VIRA	6	0.83
		WFIB	93	0.22
		WISN	8	0.83
Total Observations: Wet Alkali Meadow/Wet Meadow			658	
Water	**Riverine**	AMWI	7	0.65
		BWTE	2	0.29
		CITE	113	0.29
		GADW	64	0.22
		GWTE	41	0.37
		MALL	255	0.55
		NOPI	55	0.22
		AMBI	1	0.11
		AMCO	21	0.49
		BCNH	12	0.26
		GBHE	3	0.38
		LEBI	1	0.11
		PBGR	2	0.67
		SNEG	3	0.42
		SORA	2	Not Rated
		VIRA	1	Not Rated
		WISN	2	0.22
Total Observations of HIS: Water/Riverine Habitats			585	
Dry Alkali Meadow	**Perennial Grassland**	CITE	2	0.22
		GADW	1	0.50
		MALL	1	0.89
		NOPI	10	0.89
		AMBI	1	Not Rated
		GREG	2	0.67
		GRYE	2	Not Rated
		KILL	64	0.81
		LBCU	2	0.61
		SACR	1	Not Rated
		SORA	1	Not Rated
		VIRA	1	Not Rated
Total Observations: Perennial Grassland			88	
Gooding Red Willov	**Desert Riparian**	MALL	3	0.44
		AMCO	1	Not Rated
		BCNH	3	0.67
		GBHE	2	0.67
		GREG	3	0.22
		VIRA	1	0.22
Total Observations: Godding Red Willow/Desert Riparian			13	
Parry Saltbush	**Alkali Desert Scrub**	KILL	1	0.78
Total Observations: Parry Saltbush/Alkali Desert Scrub			1	

8.15. References

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8.16. Appendices Section 8.0

8.16.1. Appendix 1. Habitat Types in the DHA of the LORP(adapted from WHA 2004)

Water: Permanently flooded aquatic habitats; may be complimented by sparse obligate hydrophytes comprising less than 25% cover. Water is typically less than 3 feet deep and occurs in discontinuous channels and shallow depressions in floodplain land types.

Alkali Marsh: Includes permanently flooded and saturated habitat dominated by obligate hydrophytes. Dominant plants include southern cattail (*Typha domingensis*), hard stem bulrush (*Schoenoplectus acutus*), saltmarsh bulrush (*Schoenoplectus maritimus*), and pale spikerush (*Eleocharis macrostachya*). Total vegetation cover exceeds 90%.

Wet Alkali Meadow: This vegetation type occurs on floodplains with a high water table; dominant plant include saltgrass (*Distichlis spicata*), Baltic rush (*Juncus balticus*), clustered field sedge (*Carex praegracilis*), and common threesquare (*Schoenoplectus pungens*). Scattered saltcedar (*Tamarix ramosissima*) is present, particularly along the Delta East route. Total vegetation cover is greater than 50%.

Alkali Meadow: The dominant plant species is saltgrass. Other species that may be present include Parry's saltbush (*Atriplex parryi*) and Mojave seablite (*Suaeda moquinii*). Total cover ranges from 20% to 70%. Alkali meadow occurring on floodplain and lacustrine lands are classified as wetland habitats, while alkali meadow vegetation occurring on low terrace or eolian lands are not wetlands.

Gooding-red Willow Forest: White Horse Associates referred to this vegetation type as relict in the DHA because these trees were established on scoured, seasonally flooded substrates that have since been inundated and engulfed by alkali marsh. The Gooding-red willow areas are now permanently flooded and there are many decadent or dead trees. Total tree cover ranges from 10 - 60% with Gooding's willow (*Salix gooddingii*) as the dominant tree species. Fremont cottonwood (*Populus fremontii*) may be present. In most areas where tree willows exist, the understory is alkali marsh.

Rabbitbrush/Nevada Saltbrush Scrub/meadow: The vegetation type occurs in the northern part of the DHA. Average total shrub cover is 25% and average total grass cover ranges from less than 15% to 40%; Dominant species are Nevada saltbush (*Atriplex torreyi*), rubber rabbitbrush (*Ericameria nauseosa*) and saltgrass.

Dune: Dunes occur along the western flank of the west branch. This habitat type is similar to Parry's saltbush, but the depth of the sand varies from one to two meters; clusters of alkali tolerant shrubs such as greasewood (*Sarcobatus vermiculatus*), shrubby alkali aster (*Machaeranthera carnosa*) and tamarisk are present and sparse saltgrass may be present.

Parry's Saltbush: This vegetation type includes sandy habitat dominated by alkali tolerant shrub and herbaceous species. Shrubs species typically include Parry's saltbush and Mojave seablite and occasionally greasewood. Saltgrass is typically present, but with low cover. Total shrub cover ranges from 10-30% and total herbaceous cover is less than 10%.

Playa Complex (playa and brine pool): Barren areas that occur in lacustrine land that are seasonally saturated to flooded.

Road: This cover type was not mapped in 2006 and is associated with the Owens Lake Project's cells. These roads were not built in 2005, or at least were not evident in the imagery used to map the vegetation conditions in of the DHA.

8.16.2. Appendix 2. Acreage of Habitat Types as they Existed in 2000 and 2005 Under Preproject Conditions

Delta Habitat Type (2005)	Delta Habitat Type (2000)	Acreage (2000)	%Total (2000)	Acreage (2005)	%Total (2005)
Playa complex	Playa	1402	39.2%	1324.9	37.0%
	Brine Pool	58	1.6%	Not mapped (estimated at 5%)	
Eolian complex	Parry saltbush	1210	33.8%	1412.1	39.5%
	Dune	50	1.4%	Not mapped (estimated at 5%)	
Saltgrass	Alkali meadow	267	7.5%	569.8	15.9%
Saltgrass-rush	Wet alkali meadow	366	10.2%	112.9	3.2%
Alkali marsh complex	Alkali marsh	192	5.4%	97.9	2.7%
	Gooding-red willow/alkali marsh	18	0.5%	Not mapped (estimated at 10%)	
Rabbitbrush/Nevada saltbush	Rabbitbrush/Nevada saltbush	8	0.2%	55.9	1.6%
Water	Water	7	0.2%	4.5	0.1%
Total Acres		**3578**		**3578**	

8.16.3. Appendix 3. UTM Coordinates for bird survey stations (NAD 27, Zone 11, CONUS)

Route	Point	Easting	Northing
Delta West	DW01	412409	4044358
	DW02	412411	4044110
	DW03	412491	4043879
	DW04	412609	4043648
	DW05	412679	4043416
	DW06	412791	4043163
	DW07	412876	4042925
	DW08	412944	4042674
	DW09	413043	4042440
	DW10	413231	4042256
	DW11	413416	4042067
	DW12	413569	4041869
	DW13	413706	4041659
	DW14	413823	4041423
	DW15	413959	4041202
	DW16	414072	4040969
	DW17	414219	4040775
	DW18	414321	4040546
	DW19	414397	4040318
	DW20	414481	4040169
	DW21	414557	4040006
	DW22	414607	4039835
	DW23	414679	4039601
	DW24	414800	4039276
	DW25	414872	4038939
Delta East	DE01	412605	4044218
	DE02	412800	4044259
	DE03	413039	4044151
	DE04	413350	4044088
	DE05	413612	4043992
	DE06	413833	4043681
	DE07	413906	4043286
	DE08	413941	4042885
	DE09	413980	4042492
	DE10	414030	4042047
	DE11	414094	4041719
	DE12	414287	4041397
	DE13	414391	4041083
	DE14	414564	4040813
	DE15	414740	4040582
	DE16	414843	4040317
	DE17	414917	4040031

8.16.4. Appendix 4. Personnel conducting DHA bird surveys

Personnel	Affiliation	2002	2005	2009
Debbie House	LADWP	X	X	X
Chris Allen	LADWP			X
Leah Kirk	ICWD	X		
Chris Howard	ICWD			X
Mike Prather	Volunteer	X		
Judy Wickman	Volunteer	X		

8.16.5. Appendix 5. Four-letter Codes, Common Names and Scientific Names of Bird Species Detected in the DHA

Code	Common Name	Scientific Name
SNGO	Snow Goose	*Chen caerulescens*
GADW	Gadwall	*Anas strepera*
AMWI	American Wigeon	*Anas americana*
MALL	Mallard	*Anas platyrhynchos*
BWTE	Blue-winged Teal	*Anas discors*
CITE	Cinnamon Teal	*Anas cyanoptera*
NOPI	Northern Pintail	*Anas acuta*
GWTE	Green-winged Teal	*Anas crecca*
CAQU	California Quail	*Callipepla californica*
PBGR	Pied-billed Grebe	*Podilymbus podiceps*
AWPE	American White Pelican	*Pelecanus erythrorhynchos*
AMBI	American Bittern	*Botaurus lentiginosus*
LEBI	Least Bittern	*Ixobrychus exilis*
GBHE	Great Blue Heron	*Ardea herodias*
GREG	Great Egret	*Ardea alba*
SNEG	Snowy Egret	*Egretta thula*
BCNH	Black-crowned Night-Heron	*Nycticorax nycticorax*
WFIB	White-faced Ibis	*Plegadis chihi*
NOHA	Northern Harrier	*Circus cyaneus*
COHA	Cooper's Hawk	*Accipiter cooperii*
RTHA	Red-tailed Hawk	*Buteo jamaicensis*
FEHA	Ferruginous Hawk	*Buteo regalis*
MAKE	American Kestrel	*Falco sparverius*
MERL	Merlin	*Falco columbarius*
PEFA	Peregrine Falcon	*Falco peregrinus*
PRFA	Prairie Falcon	*Falco mexicanus*
VIRA	Virginia Rail	*Rallus limicola*
SORA	Sora	*Porzana carolina*
AMCO	American Coot	*Fulica americana*
SACR	Sandhill Crane	*Grus canadensis*
SEPL	Semipalmated Plover	*Charadrius semipalmatus*
KILL	Killdeer	*Charadrius vociferus*
BNST	Black-necked Stilt	*Himantopus mexicanus*
AMAV	American Avocet	*Recurvirostra americana*
GRYE	Greater Yellowlegs	*Tringa melanoleuca*
LBCU	Long-billed Curlew	*Numenius americanus*
WESA	Western Sandpiper	*Calidris mauri*
LESA	Least Sandpiper	*Calidris minutilla*
SBDO	Short-billed Dowitcher	*Limnodromus griseus*
WISN	Wilson's Snipe	*Gallinago delicata*
WIPH	Wilson's Phalarope	*Phalaropus tricolor*
CAGU	California Gull	*Larus californicus*
MODO	Mourning Dove	*Zenaida macroura*
GHOW	Great Horned Owl	*Bubo virginianus*
LENI	Lesser Nighthawk	*Chordeiles acutipennis*
CONI	Common Nighthawk	*Chordeiles minor*
VASW	Vaux's Swift	*Chaetura vauxi*
WTSW	White-throated Swift	*Aeronautes saxatalis*
BCHU	Black-chinned Hummingbird	*Archilochus alexandri*
RUHU	Rufous Hummingbird	*Selasphorus rufus*
BEKI	Belted Kingfisher	*Megaceryle alcyon*
LBWO	Ladder-backed Woodpecker	*Picoides scalaris*
NUWO	Nuttall's Woodpecker	*Picoides nuttallii*
NOFL	Northern Flicker	*Colaptes auratus*
OSFL	Olive-sided Flycatcher	*Contopus cooperi*
WEWP	Western Wood-Pewee	*Contopus sordidulus*
WIFL	Willow Flycatcher	*Empidonax traillii*
GRFL	Gray Flycatcher	*Empidonax wrightii*
DUFL	Dusky Flycatcher	*Empidonax oberholseri*
BLPH	Black Phoebe	*Sayornis nigricans*
SAPH	Say's Phoebe	*Sayornis saya*
ATFL	Ash-throated Flycatcher	*Myiarchus cinerascens*
WEKI	Western Kingbird	*Tyrannus verticalis*
LOSH	Loggerhead Shrike	*Lanius ludovicianus*
WAVI	Warbling Vireo	*Vireo gilvus*

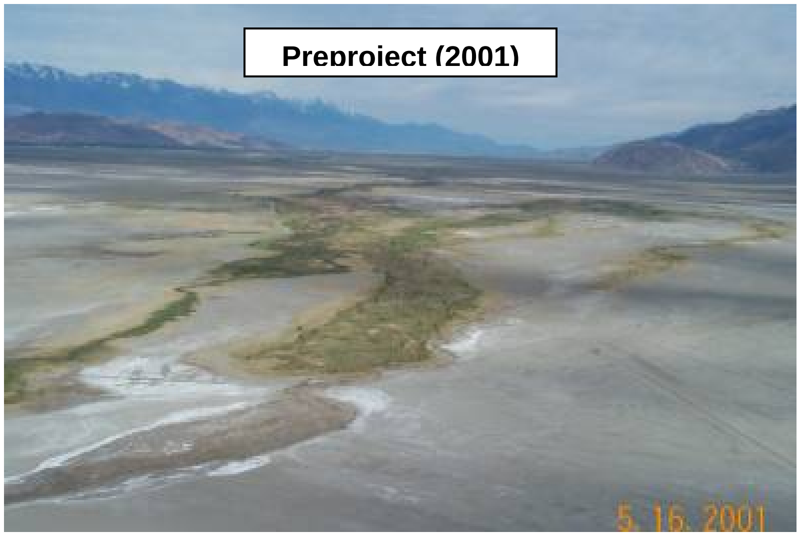
Code	Common Name	Scientific Name
BBMA	Black-billed Magpie	*Pica hudsonia*
CORA	Common Raven	*Corvus corax*
HOLA	Horned Lark	*Eremophila alpestris*
TRES	Tree Swallow	*Tachycineta bicolor*
VGSW	Violet-green Swallow	*Tachycineta thalassina*
NRWS	Northern Rough-winged Swallow	*Stelgidopteryx serripennis*
BANS	Bank Swallow	*Riparia riparia*
CLSW	Cliff Swallow	*Petrochelidon pyrrhonota*
BARS	Barn Swallow	*Hirundo rustica*
CACW	Cactus Wren	*Campylorhynchus brunneicapillus*
BEWR	Bewick's Wren	*Thryomanes bewickii*
MAWR	Marsh Wren	*Cistothorus palustris*
RCKI	Ruby-crowned Kinglet	*Regulus calendula*
BGGN	Blue-gray Gnatcatcher	*Polioptila caerulea*
HETH	Hermit Thrush	*Catharus guttatus*
NOMO	Northern Mockingbird	*Mimus polyglottos*
SATH	Sage Thrasher	*Oreoscoptes montanus*
LCTH	Le Conte's Thrasher	*Toxostoma lecontei*
EUST	European Starling	*Sturnus vulgaris*
AMPI	American Pipit	*Anthus rubescens*
CEDW	Cedar Waxwing	*Bombycilla cedrorum*
PHAI	Phainopepla	*Phainopepla nitens*
OCWA	Orange-crowned Warbler	*Vermivora celata*
NAWA	Nashville Warbler	*Vermivora ruficapilla*
YWAR	Yellow Warbler	*Dendroica petechia*
YRWA	Yellow-rumped Warbler	*Dendroica coronata*
BTYW	Black-throated Gray Warbler	*Dendroica nigrescens*
TOWA	Townsend's Warbler	*Dendroica townsendi*
MGWA	MacGillivray's Warbler	*Oporornis tolmiei*
COYE	Common Yellowthroat	*Geothlypis trichas*
WIWA	Wilson's Warbler	*Wilsonia pusilla*
SPTO	Spotted Towhee	*Pipilo maculatus*
CHSP	Chipping Sparrow	*Spizella passerina*
BRSP	Brewer's Sparrow	*Spizella breweri*
VESP	Vesper Sparrow	*Pooecetes gramineus*
BTSP	Black-throated Sparrow	*Amphispiza bilineata*
SAGS	Sage Sparrow	*Amphispiza belli*
SAVS	Savannah Sparrow	*Passerculus sandwichensis*
FOSP	Fox Sparrow	*Passerella iliaca*
SOSP	Song Sparrow	*Melospiza melodia*
LISP	Lincoln's Sparrow	*Melospiza lincolnii*
WCSP	White-crowned Sparrow	*Zonotrichia leucophrys*
CCLO	Chestnut-collared Longspur	*Calcarius ornatus*
WETA	Western Tanager	*Piranga ludoviciana*
LAZB	Lazuli Bunting	*Passerina amoena*
RWBL	Red-winged Blackbird	*Agelaius phoeniceus*
WEME	Western Meadowlark	*Sturnella neglecta*
YHBL	Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*
BRBL	Brewer's Blackbird	*Euphagus cyanocephalus*
GTGR	Great-tailed Grackle	*Quiscalus mexicanus*
BHCO	Brown-headed Cowbird	*Molothrus ater*
HOOR	Hooded Oriole	*Icterus cucullatus*
BUOR	Bullock's Oriole	*Icterus bullockii*
HOFI	House Finch	*Carpodacus mexicanus*
PISI	Pine Siskin	*Spinus pinus*
LEGO	Lesser Goldfinch	*Spinus psaltria*
AMGO	American Goldfinch	*Spinus tristis*
Codes for birds not identified to species		
UNTE	Unidentified Teal	*Anas* spp.
PEEX	Unidentified Calidris sp.	*Calidris* spp.
SHRX	Unidentified Shorebird species	Charadriiformes spp.
UNSW	Unidentified Swift sp.	Apodidae spp.
UNHU	Unidentified Hummingbird	Trochilidae spp.
UNWO	Unidentified Woodpecker	Picidae spp.
UNEF	Unidentified *Empidonax* Flycatcher	*Empidonax* spp.
UNSW	Unidentified Swallow	Hirundidae spp.

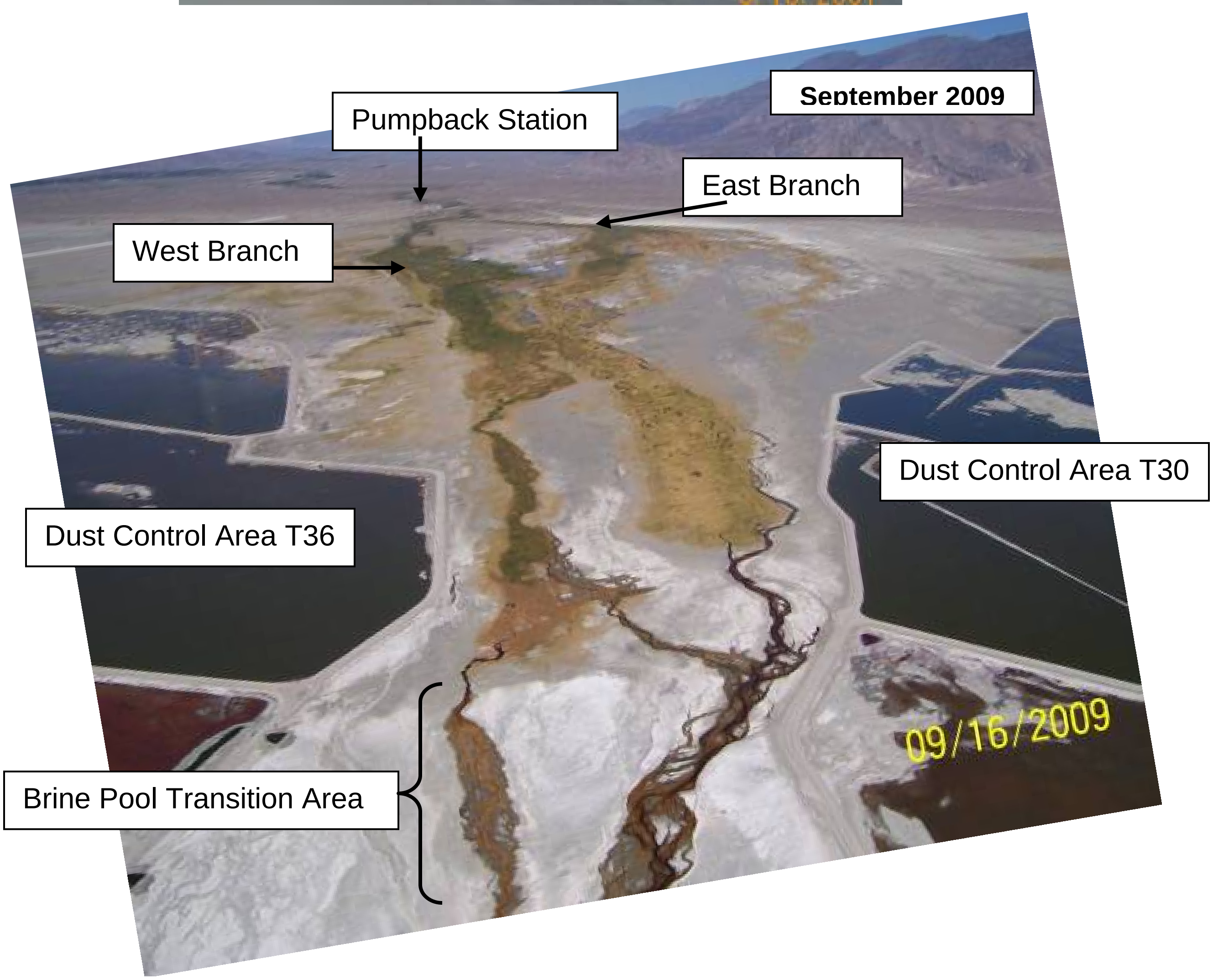
8.16.6. Appendix 6. Other Wildlife Species Encountered Opportunistically During Bird Surveys

Common Name	**Scientific Name**
Bullfrog	*Rana catesbeiana*
Coachwhip	*Masticophis flagellum*
Gopher Snake	*Pituophis catenifer*
Long-nosed Leopard Lizard	*Gambelia wislizenii*
Zebra-tailed Lizard	*Callisaurus draconoides*
Desert Horned Lizard	*Phrynosoma platyrhinos*
Desert Spiny Lizard	*Sceloporus magister*
Side-blotched Lizard	*Uta stansburiana*
Western Whiptail	*Aspidoscelis tigris*
Black-tailed Jackrabbit	*Lepus californicus*
Beaver	*Castor canadensis*
Owens Valley Vole	*Microtus californicus vallicola*
White-tailed Antelope Ground Squirrel	*Ammospermophilus leucurus*
Coyote	*Canis latrans*
Racoon	*Procyon lotor*
Mink	*Mustela vison*
Tule Elk	*Cervus elaphus nannodes*

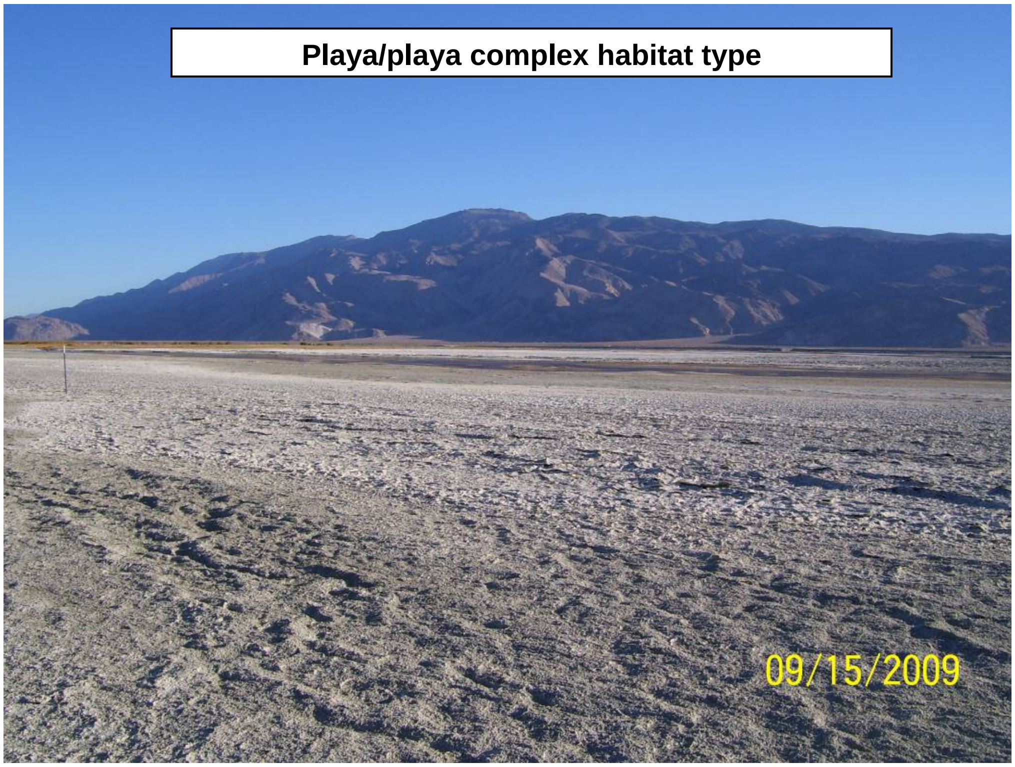
8.16.7. Appendix 7. Delta Habitat Assessment Photos

Aerial View of Delta Habitat Area – May 2001 (Preproject) and September 2009

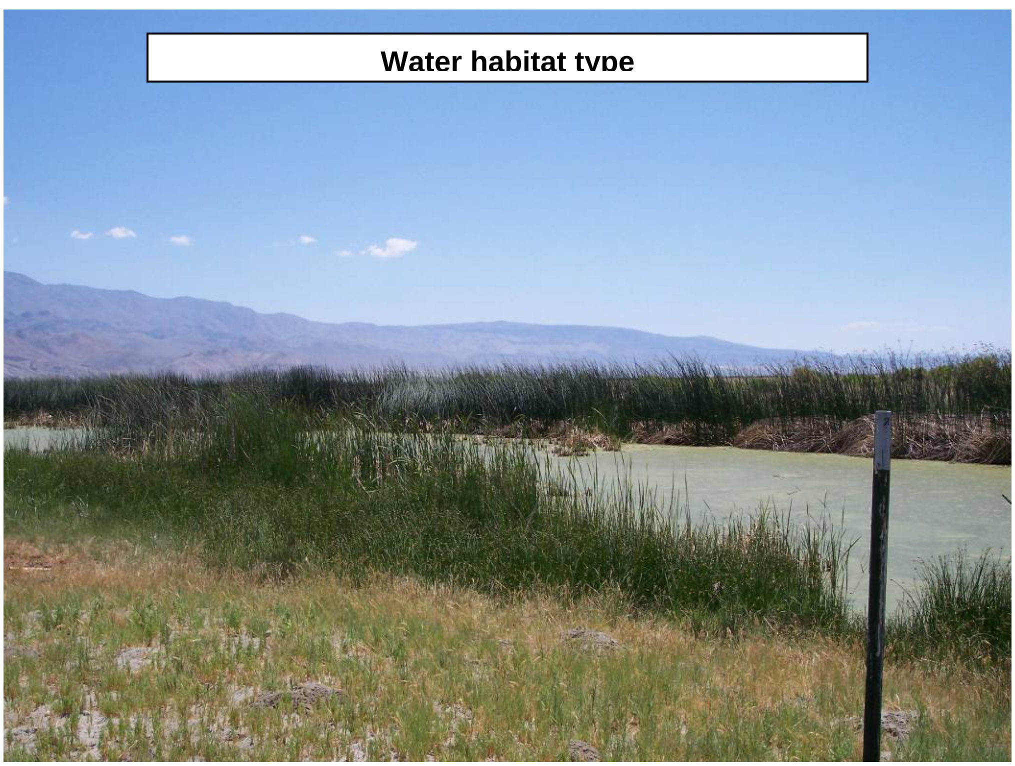




Representative Photos of Habitat Classifications Used During Bird Monitoring.



Playa/playa complex habitat type

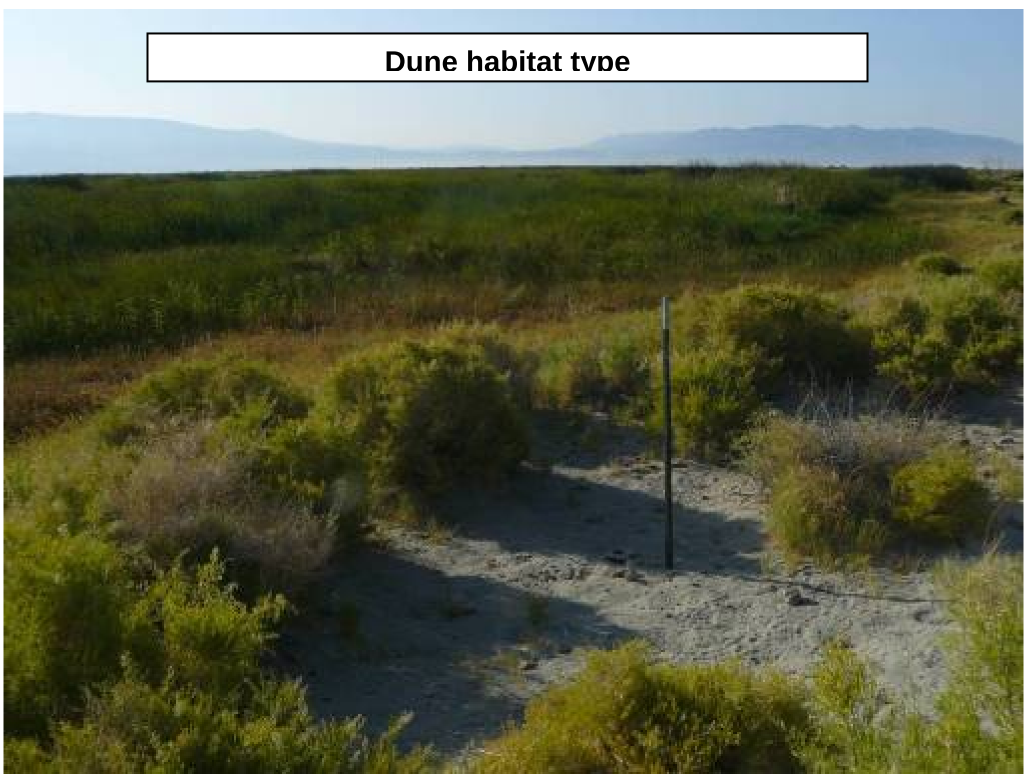


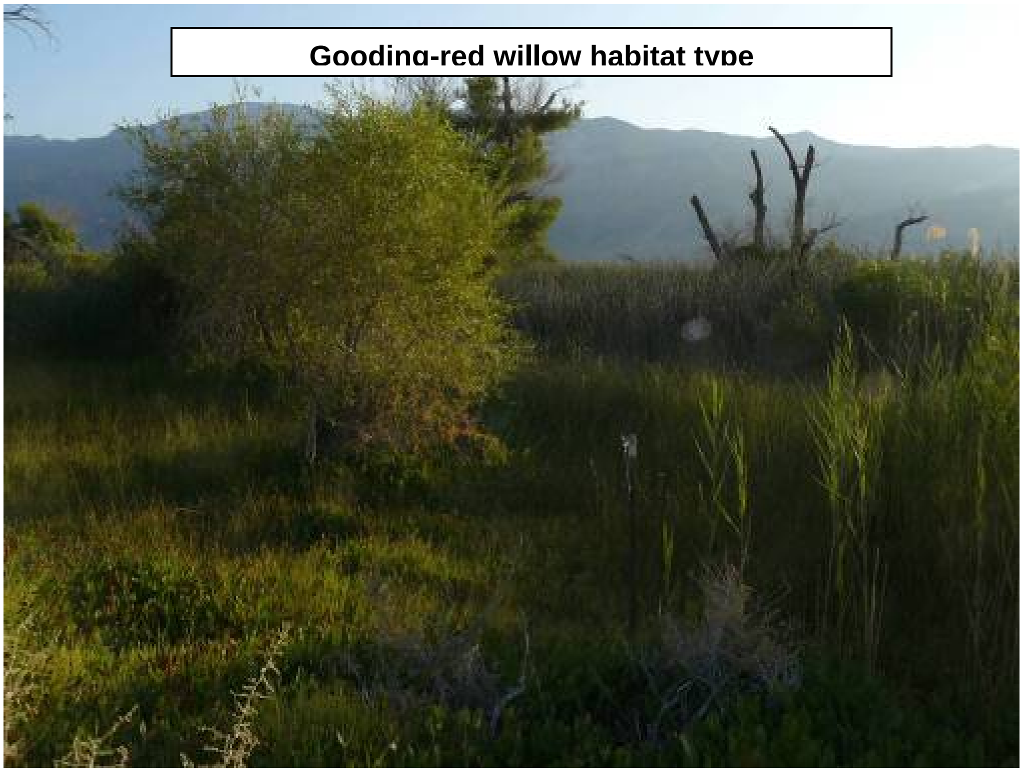
Water habitat type

Alkali Marsh habitat type

Wet Meadow habitat type


Alkali Meadow habitat type


Dune habitat type



Gooding-red willow habitat type

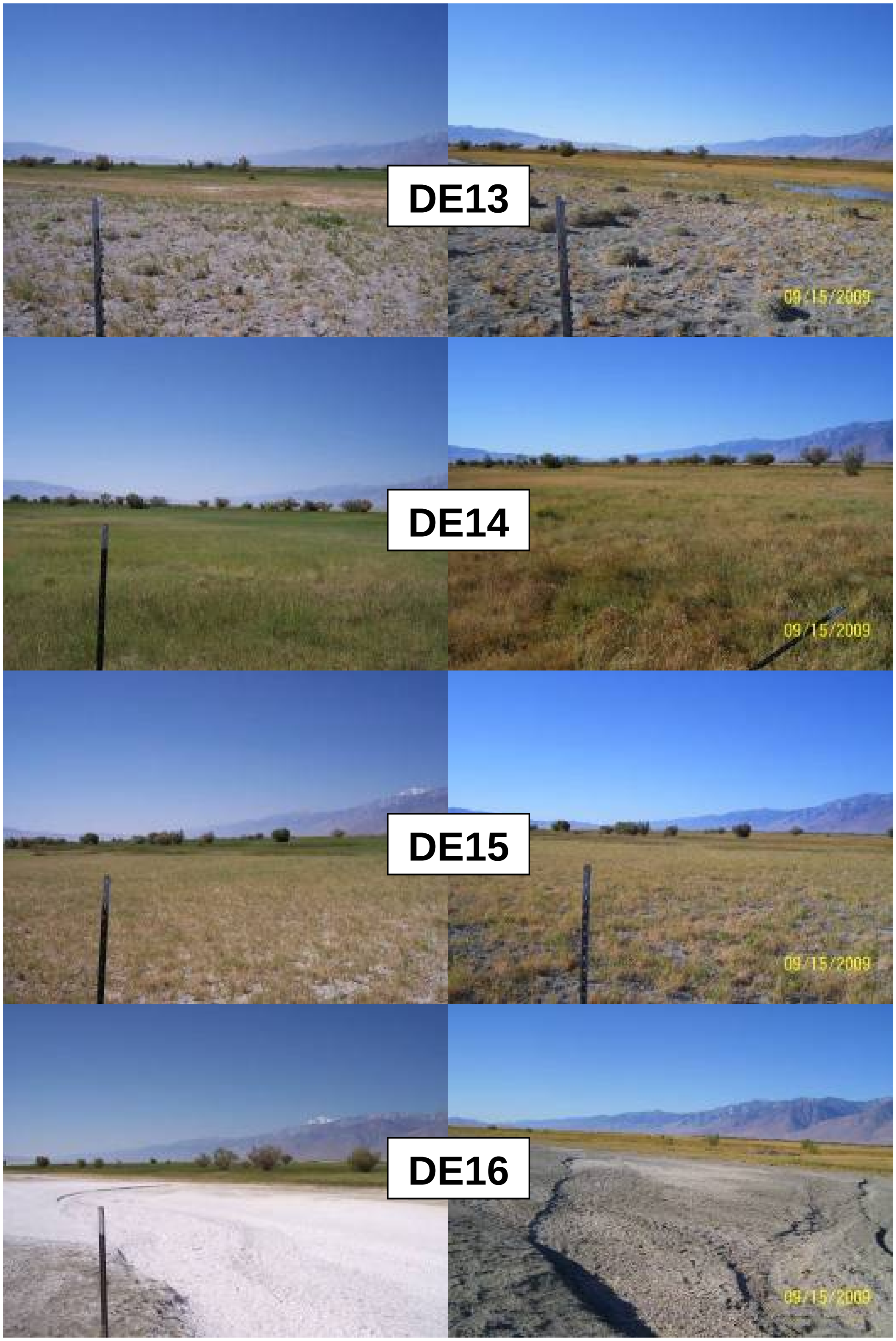
Photos Taken at Monitoring Stations Along Delta East Route - 2005 and 2009

2005 **2009**

2005 **2009**

2005 **2009**

2005 **2009**



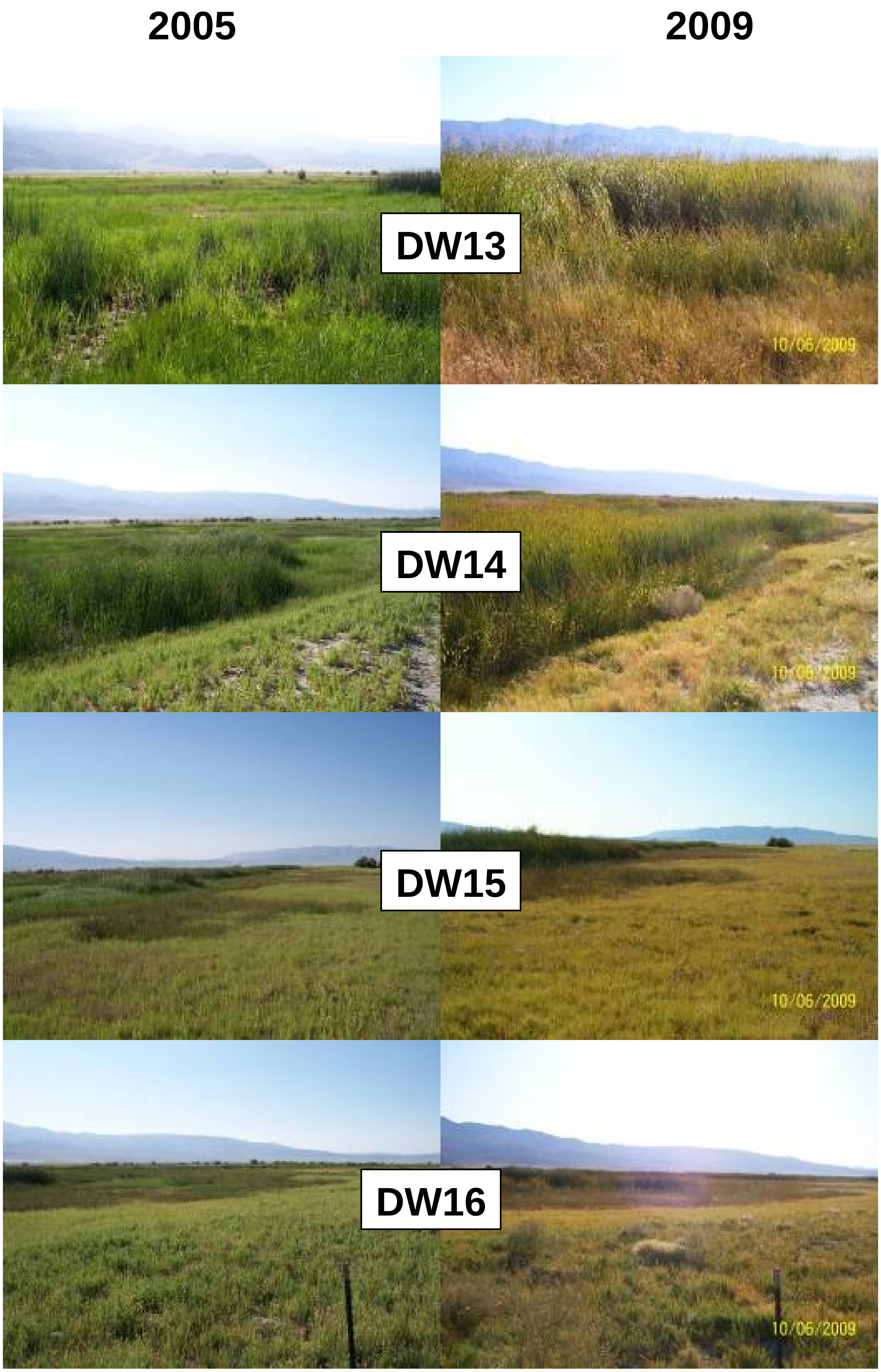
2005 **2009**

Photos Taken at Monitoring Stations Along Delta West Route - 2005 and 2009

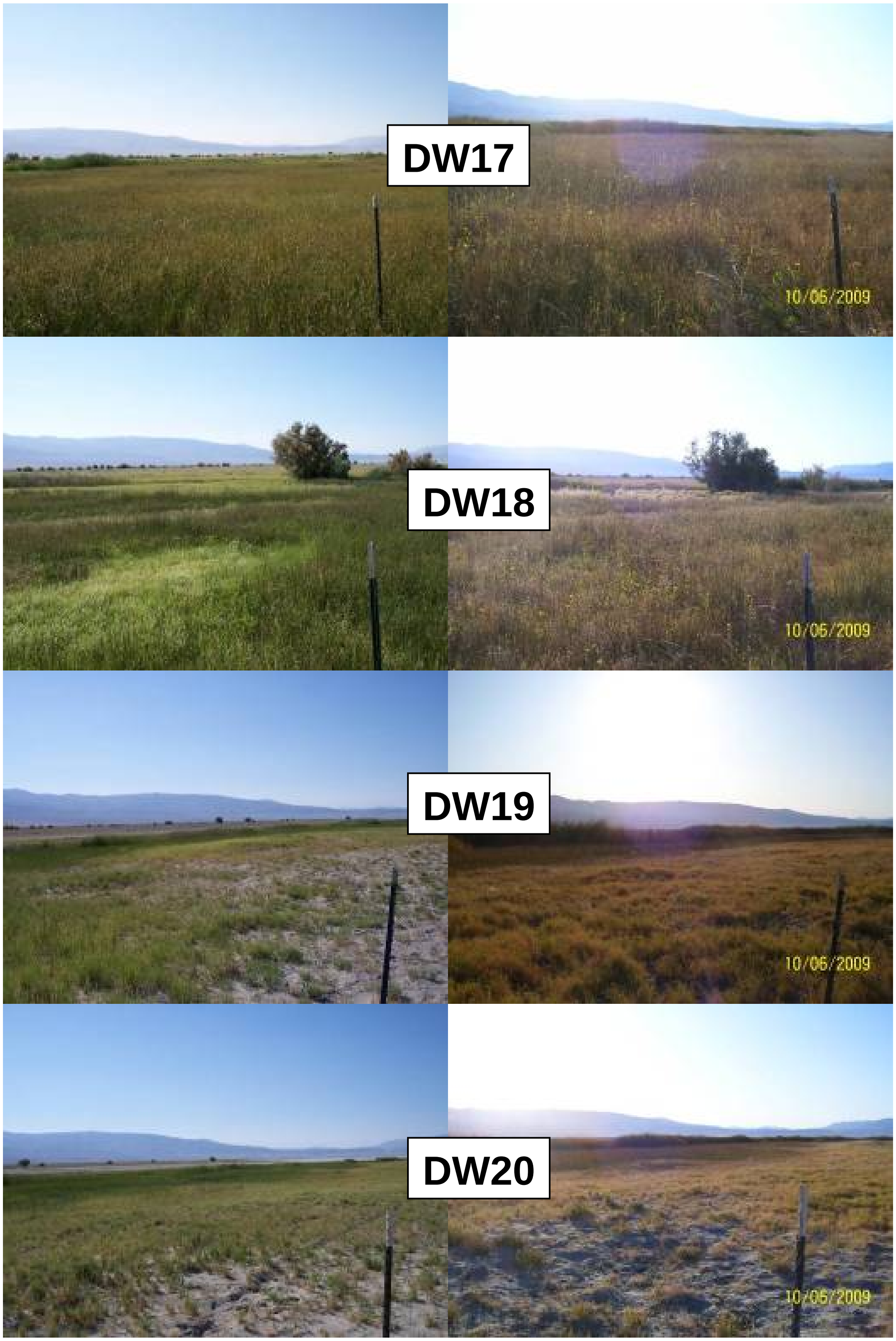
2005 **2009**

2005 **2009**

2005 **2009**


2005
2009
DW13
10/06/2009
DW14
10/06/2009
DW15
10/06/2009
DW16
10/06/2009

2005 **2009**



2005 **2009**

2005 **2009**

8.16.8. Appendix 8. California Wildlife Habitat Relationships System

Alkali Desert Scrub

Peter G. Rowlands

Vegetation

Structure-- Alkali Scrub plant assemblages (primarily chenopods) are generally subdivided into two phases: xerophytic and halophytic (Hunt, 1966, Twisselman, 1967, Vasek and Barbour, 1977, Turner, 1982a, b). The xerophytic phase (here, including Shadscale Scrub) consists of open stands of very low to moderately high (0.25-2.0 m; 0.8-6.6 ft) grayish, spinescent, leptophyllous to microphyllous subshrubs and shrubs, which are physiognomically uniform, widely spaced, occur on relatively dry soils, and exhibit low to moderate osmotic tolerance (Billings 1949, 1951, Küchler 1964, Knapp 1965, Johnson 1976, Thorne 1976, Vasek and Barbour 1977, Crosswhite and Crosswhite 1982, Fowler and Koch 1982). The halophytic phase consists of suffrutescent species which exhibit varying degrees of succulence, are generally more closely spaced than the xerophytic phase, tolerate periodic flooding, and generally exhibit a high degree of osmotic tolerance (Flowers 1934, Hunt 1966, Twisselman 1967, Johnson 1976, Vasek and Barbour 1977).

Composition-- Some primary perennial plant species of the xerophytic phase include various species of shrubby saltbushes, especially allscale, desert holly, fourwing saltbush, Nuttall saltbush, big saltbush, Parry saltbush, shadscale, Torrey salt bush, and western Mojave saltbush (Cheatham and Haller 1975, Thorne 1976, Vasek and Barbour 1977). Other important shrubs include bud sagebrush, white bursage, cresotebush, Fremont dalea, Nevada ephedra, black greasewood, spiny hopsage, spiny menodora, rabbit-thorn, Thurber sandpaper-plant, winterfat, and Anderson wolfberry. Subshrubs common in the xerophytic phase include cheesebush, desert alyssum, desert prince's plume, alkali goldenbush, Cooper goldenbush, Shockley goldenhead, honeysweet, and common snakeweed. The diversity of cactuses and other succulents in the Alkali Scrub is relatively low; however, cottontop cactus, hedgehog cactus, beavertail pricklypear, grizzlybear pricklypear, staghorn cholla, and redspined sclerocactus may be common in certain areas. Forbs and grasses that characterize the xerophytic phase of the Alkali Scrub or are known only from this type of vegetation include Torrey blazingstar, kidney-leaved buckwheat, obtuse-leaved cleomella, desert sunbonnet, Booth evening-primrose, browneyed evening-primrose, desert globe-mallow, Nevada goosefoot, oligameris, oxystylis, desert pepperweed, annual psathyrotes, leaf-cover saltweed, Lemmon scurfpea, white-margined spurge, Nevada sumpweed, hairy wildcabbage, sand dropseed, galletagrass, Indian ricegrass, and King eyelashgrass (Beatley, 1976) (Bureau of Land Management, unpublished data on file; P. G. Rowlands, unpublished data). Trees are generally not present in the xerophytic phase of Alkali Scrub.

Some of the primary perennial shrub and subshrub species of the halophytic phase of Alkali Scrub include arrow-weed, black greasewood, alkali goldenbush; species of kochia, iodinebush, alkali rubber rabbitbrush; species of seablite, in particular, alkali blite, and Mojave seablite; and species of saltbush and saltcedar. Forbs and grasses are important constituents of the halophytic phase. Among the more notable are alkaliheath, alkaliweed, weak arrowgrass, canaigre, common glasswort, salt heliotrope, western miterwort, various species of annual saltbushes, Cooper wirerush, yerba mansa, aparejograss, alkali muhly, alkali sacaton, and saltgrass. Cactuses are noticeably absent from this phase. Screwbean, western honey-mesquite, and saltcedar may occasionally form a sparse overstory. Munz and Keck (1959), Ornduff (1974), Cheatham and Haller (1975), Thorne (1976), and Vasek and Barbour (1977) list these and many other secondary associates.

Other Classifications-- Other names for the Alkali Scrub habitat include Shadscale Series, Arrow-weed Series (in part), Pickleweed Series, and Saltgrass Meadow (in part) (Parker and Matyas 1981), Shadscale Zone (Billings 1949), Valley Saltbush Scrub, Great Basin Saltbush Scrub (habitat types 3.611-3.613), Intermittently Moist Alkali Sink, Permanently Moist Alkali Sink (in part, habitat types 3.621-3.622), and Alkali Seep (habitat type 3.63, in part) (Cheatham and Haller, 1975), Arrow-weed Series (in part) (Cheatham and Haller, 1975), Greasewood Series, Saltbush Series, Pickleweed Series (in part) (Payson et al. 1980), Saltbush-Greasewood Vegetation (No. 40, Küchler 1964), Shadscale Series, Saltbush Series (152.12, 152.17, Brown et al. 1980), Desert Saltbush (No. 45), San Joaquin Saltbush (No. 47), and Alkali Scrub Woodland (No. 48) (Küchler, 1977), Saline-Alkali Scrub and Desert Alkali Grassland (in part) (Rowlands et al. 1982), Shadscale Community, Gray Molly Community, Saltdesert Shrub Zone (Fowler and Koch 1982).

Habitat Stages

Vegetation Changes-- 1.24:S-M. There are few, if any, undisputed examples of plant succession (as described by Odum 1971) occurring in deserts (Lathrop and Rowlands, 1982). The alkali scrub is a heterogeneous habitat whose component plant assemblages vary considerably in composition along gradients of moisture, salinity, and microtopography (Cannon 1908, Flowers 1934, Billings 1949, Marks 1950, Hunt 1966, Mitchell et al. 1966, Twisselman 1967, West and Ibrahim 1968, Vasek and Barbour 1977, Vasek and Lund 1980). However, a succession, of sorts, was observed by Vasek and Lund (1980) on the edge of Rabbit Dry Lake. Kochia was succeeded successively by Torrey saltbush, alkali goldenbush, and shadscale, with a concomitant accumulation and coalescence of earth mounds. Hunt (1966) described a plant zonation in Death Valley along a salinity gradient starting with iodinebush (tolerant to 6% salt) and continuing through Cooper wirerush, saltgrass, Mojave seablite, saltcedar, alkali sacaton, fourwing saltbush, arrow-weed, and western honey mesquite (tolerant to 2% salt). At soil salinities below 2 percent, a xerophytic alkali scrub of desert holly and allscale predominates and grades into creosotebush. Similar observations were made by Bradley (1970) around Saratoga Springs.These habitat stages may exist as any of structural classes 1.2-4:S-M.

In addressing long-term changes in shadscale communities, Holmgren and Hutchings (1972) (Was written as Hutchins in draft. I changed to Hutchings to match Hab Lit Cite.)stated that shadscale has become a much more important constituent of many cold desert communities than before exploitation of western rangelands. Shadscale increases as more desirable forage species are weakened. However, compositional change under protection or under grazing treatments favorable to range improvement is not linear over time and may require either man caused natural catastrophic events to be set in motion.

Duration of Stages-- Fourwing saltbush appears to have a life span of around 20 years (Wallace and Romney 1972). Other species of shrubby saltbushes probably live about as long or within an order of magnitude. Spiny hopsage, often an associate species, was also found to have a similar life span (Wallace and Romney 1972). Two subshrubs, common snakeweed (West et al. 1979) and desert alyssum (Rowlands unpublished) live about 8-10 years. Indian ricegrass has an observed longevity of about 19 years (West et al. 1979). In cold desert communities, plants seem to be highly plastic with no reliable size-age relationship (West et al. 1979). However, general patterns may be inferred. Dominant shrub species of the Alkali Scrub may live for decades; overstory species, such as Joshua trees or mesquite, live for centuries; and pioneer subshrubs, except under continuous grazing pressure, do not persist for more than a decade. Recovery following severe disturbance in the Alkali Scrub, like other desert scrub types, requires decades and perhaps centuries, (Webb et al. 1982).

Biological Setting

Habitat-- Alkali Scrub vegetation generally occurs at lower to middle elevations and interdigitates with a number of other arid and semiarid wildlife habitats. At lower elevations, Alkali Scrub may intermingle with Barren (BAR) salt flats and Desert Scrub (DSC); and in the southern part of its range, Palm Oasis (POS). At lower-middle elevation Alkali Scrub may interface with Joshua Tree (JST); and at upper middle elevations, with Juniper (JUN), Pinyon-Juniper (PJN), Sagebrush (SGB), Low Sagebrush (bSB), and Bitterbrush (BBR). Throughout its range, Desert Wash (DSW) and Desert Riparian (DRI) may occur within the Alkali Scrub. In the San Joaquin Valley, Alkali Scrub borders on Annual Grassland (AGS) habitat. In many locations, Alkali Scrub overlaps with Perennial Grassland (PGS).

Wildlife Considerations-- Characteristic species of the shadscale aspect of the xerophytic phase of Alkali Scrub include the pallid kangaroo mouse, chisel-toothed kangaroo rat, zebra-tailed lizard, and the San Emigdio blue butterfly, whose host plant is fourwing saltbush (Jaeger and Smith 1966, Pyle 1981). Characteristic species of other aspects of Alkali Scrub habitat are the Mojave ground squirrel, zebra-tailed lizard, and long-nosed leopard lizard.

Physical Setting

Alkali Scrub types can generally be found surrounding the receding shores of large prehistoric lakes or alkali playas that mark the locations of dry lake beds (Fowler and Koch 1982). At sites where the halopytic phase predominates, the available groundwater is usually at or very close to the surface and is heavily mineralized (Turner 1982b). Hunt (1966) reported that soils in allscale stands (i.e., xerophytic phase) contained few salts, though the water table was as shallow as 5 m (16.4 ft), but permanent water was mostly much deeper. The soils under allscale communities are often very deep, tend to have high proportions of silt and clay, and have a much greater moisture holding capacity than soils of creosotebush communities (Schantz and Piemeisel 1924, Marks 1950, Vasek and Barbour 1977, Turner 1982b). Conversely, soils supporting desert holly are often very coarse and gravelly (Hunt 1966).

Climatic conditions associated with Alkali Scrub include generally low precipitation and relative humidity, high summer temperatures (mean July maxima, 30 to 47 C; or 86 to 117 F), rather cool winter temperatures (mean January minima, 8 to 5 C or 18 to 41 F), and very high levels of solar radiation all year round, especially during the summer. Precipitation ranges from around 42 to 230 mm (1.7 to 9.1 in) per year; depending upon location (Rowlands et al. 1982).

Distribution

Alkali Scrub vegetation occurs in California throughout the Mojave Desert, parts of the Colorado Desert, parts of northeastern California within the Great Basin, and in the southern San Joaquin Valley. Examples of the halophytic phase of alkali scrub are common in California deserts, but are scattered and usually associated with dry lakes and flood plains of rivers such as the Mojave, Colorado, and Amargosa. Alkali Scrub phases occur from below sea level in Death Valley to over 1800 m (5900 ft) in some Great Basin locations (Rowlands et al. 1982).

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Fresh Emergent Wetland

Gary Kramer

Vegetation

Structure-- Fresh Emergent Wetlands are characterized by erect, rooted herbaceous hydrophytes. Dominant vegetation is generally perennial monocots to 2 m (6.6 ft) tall (Cheatham and Haller 1975, Cowardin et al. 1979). All emergent wetlands are flooded frequently, enough so that the roots of the vegetation prosper in an anaerobic environment (Gosselink and Turner 1978). The vegetation may vary in size from small clumps to vast areas covering several kilometers. The acreage of Fresh Emergent Wetlands in California has decreased dramatically since the turn of the century due to drainage and conversion to other uses, primarily agriculture (Gilmer et al. 1982).

Composition-- On the upper margins of Fresh Emergent Wetlands, saturated or periodically flooded soils support several moist soil plant species including big leaf sedge, baltic rush, redroot nutgrass and on more alkali sites, saltgrass. On wetter sites, common cattail, tule bulrush, river bulrush, and arrowhead are potential dominant species (Cheatham and Haller 1975, U.S. Army Corps of Engineers 1978, Wentz 1981).

Other Classifications-- Other names for Fresh Emergent Wetland habitats include riverine, lacustrine and palustrine emergent wetland (Cowardin et al. 1979); alkali marsh - 5.23 and fresh water marsh - 5.24 (Cheatham and Haller 1975); tule marsh - 37 (Küchler 1977) and cattail-sedge (Parker and Matyas 1981). The U.S. Fish and Wildlife Service summarizes several Fresh Emergent Wetland classifications according to their occurrence in certain terrestrial habitats (Proctor et al. 1980).

Habitat Stages

Vegetation Change-- 1;2:S-D. It is commonly thought that as depressions or shoreline areas that support Fresh Emergent Wetlands (FEW) accumulate silt, marsh communities are replaced by upland communities. This process is slow unless erosion, either natural or man caused, is accelerated (U.S. Army Corps of Engineers 1978). Fresh emergent wetland habitats may exist in any of the structural classes 1-2:S-D. In areas with relatively stable climatic conditions, fresh emergent wetlands maintain the same appearance year to year (Cowardin et al. 1979); however, where extreme climatic fluctuations occur, they may revert to an open water phase in some years (Stewart and Kantrund 1971).

Duration of Stages-- Fresh Emergent Wetlands are relatively stable successionally (U.S. Army Corps of Engineers 1978) but are transitory in a geological time frame (Odum 1971). Fire, flooding, and draining, maintain shallow basins where Fresh Emergent Wetlands prosper (Odum 1971); but conversion to uplands, which may take from decades to centuries, is the climax. The time this process takes depends on wetland size, rate of sedimentation, frequency of flooding and drainage, and the rate of increase in organic matter. Few studies estimate the time frame of long term wetland succession, but a wetland studied by McAndrews et al. (1976) had a history of 11,000 years and was still present.

Biological Setting

Habitat-- Fresh emergent wetland habitats may occur in association with terrestrial habitats or aquatic habitats including Riverine (RIV), Lacustrine (LAC) and Wet Meadows (WTM). The up\and limit of Fresh Emergent Wetlands is the boundary between land with predominantly hydrophytic cover and land with primarily mesophytic or xerophytic cover or the boundary between hydric and non hydric soils (Cowardin et al. 1979). The boundary between fresh emergent wetlands and deep water habitats (e.g., Lacustrine or Riverine) is the deep water edge of the emergent vegetation. It is generally accepted that this demarcation is at or above the 2 m (6.6 ft) depth (Cowardin et al. 1979, Zoltai et al. 1975). The 2 m (6.6 ft) lower limit for emergent wetlands was selected because it represents the maximum depth to which emergent plants normally grow (Welch 1952, Sculthorpe 1967).

Wildlife Considerations-- Fresh emergent wetlands are among the most productive wildlife habitats in California. They provide food, cover, and water for more than 160 species of birds (U.S. Comptroller General 1979), and numerous mammals, reptiles, and amphibians. Many species rely on Fresh Emergent Wetlands for their entire life cycle. The endangered Santa Cruz long toed salamander and rare black toad require pond water for breeding, while the rare giant garter snake use these wetlands as its primary habitat. The endangered Aleutian Canada goose, bald eagle, and peregrine falcon use Fresh Emergent Wetlands as feeding areas and roost sites (Calif. Dept. Fish Game 1980).

Physical Setting

Physical Setting-- Fresh emergent wetland habitats occur on virtually all exposures and slopes, provided a basin or depression is saturated or at least periodically flooded. However, they are most common on level to gently rolling topography. They are found in various landscape depressions or at the edge of rivers or lakes (Wentz 1981). Fresh emergent wetland vegetation zones characteristically occur as a series of concentric rings which follow basin contours and reflect the relative depth and duration of flooding. If the bottom of the wetland is very uneven, vegetation zones may be present in a patchy configuration rather than the classic concentric ring pattern (Millar 1976). Soils are predominantly silt and clay, although coarser sediments and organic material may be intermixed (Cowardin et al. 1979). In some areas organic soils (peat) may constitute the primary growth medium (U.S. Army Corps of Engineers 1978). Climatic conditions are highly variable and range from the extreme summer heat of Imperial County to the Great Basin climate of Modoc County where winter temperatures often are well below freezing (Cheatham and Haller 1975).

Distribution

Fresh emergent wetlands are found throughout California at virtually all elevations but are most prevalent below 2270 meters (7500 ft) (Cheatham and Haller 1975). The largest acreage of fresh emergent wetlands occur in the Klamath Basin, Sacramento Valley, San Joaquin Valley, Sacramento-San Joaquin Delta and Imperial Valley-Salton Sea.

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Lacustrine

William E. Grenfell Jr.

General Description

Structure-- Lacustrine habitats are inland depressions or dammed riverine channels containing standing water (Cowardin 1979). They may vary from small ponds less than one hectare to large areas covering several square kilometers. Depth can vary from a few centimeters to hundreds of meters. Typical lacustrine habitats include permanently flooded lakes and reservoirs (e.g., Lake Tahoe and Shasta Lake), intermittent lakes (e.g., playa lakes) and ponds (including vernal pools) so shallow that rooted plants can grow over the bottom. Most permanent lacustrine systems support fish life; intermittent types usually do not.

Aquatic Environment

Suspended organisms such as plankton are found in the open water of lacustrine habitats. Dominant are the phytoplankton, including diatoms, desmids and filamentous green algae. Because these tiny plants alone carry on photosynthesis in open water, they are the base upon which the rest of limnetic life depends. Suspended with the phytoplankton are animal or zooplankton organisms which graze upon the minute plants. Most characteristic are rotifers, copepods and cladocerans (Smith 1974).

The plants and animals found in the littoral zone vary with water depth, and a distant zonation of life exists from deeper water to shore. A blanket of duckweed may cover the surface of shallow water. Desmids and diatoms, protozoans and minute crustaceans, hyrdras and snails live on the under-surface of the blanket; mosquitoes and collembolans live on top. Submerged plants such as algae and pondweeds serve as supports for smaller algae and as cover for swarms of minute aquatic animals. As sedimentation and accumulation of organic matter increases toward the shore, floating rooted aquatics such as water lillies and smartweeds often appear. Floating plants offer food and support for numerous herbiverous animals that feed both on phytoplankton and the floating plants (Smith 1974).

Other Classifications-- Other names of lacustrine habitats include Lacustrine (Cowardin et al. 1979), Lakes - 10.41, Manmade Reservoirs - 10.42 and Ponds -10.43 (Cheatham and Haller 1975). The U.S. Fish and Wildlife Service summarizes several lacustrine habitats according to their occurrence in certain terrestrial habitats (Proctor et at. 1980).

Aquatic Zones and Substrates

The lacustrine habitat may exist in any of the structural classes 1:2 4:O~B. The limnetic or open water zone extends from the deepest part to the depth of effective light penetration. The submerged (littoral) zone is shallow enough to permit light penetration and occurs at the edges of lakes and throughout most ponds. Periodically flooded lacustrine habitats should be evaluated only when water is present. This stage usually cannot support fish populations, and therefore will not attract fish predators. To qualify as shoreline, there must be a water border and less than 2 percent vegetation. Shoreline vegetation exceeding 2 percent would fall into the riparian category.

Lakes and ponds are more or less temporary features of the landscape because of a slow siltation process. The time it takes depends on size, rate of sedimentation and the increase of organic matter.

Biological Setting

Habitat-- Lacustrine habitats may occur in association with any terrestrial habitats, Riverine (RIV) and Fresh Emergent Wetlands (FEW).

Wildlife Considerations-- Lacustrine habitats are used by 18 mammals, 101 birds, 9 reptiles and 22 amphibians for reproduction, food, water and cover. This represents about 23 percent of the species in the Wildlife Habitat Relationships data base. The endangered Santa Cruz long-toed salamander and rare black toad require ponds for breeding. The endangered bald eagle feeds on fish and some birds taken from lakes.

Physical Setting

The relatively calm waters of lakes and ponds offer environmental conditions that contrast sharply with those of running water. Light penetration is dependent on turbidity. Temperatures vary seasonally and with depth. Because only a small proportion of the water is in direct contact with the air and because decomposition is taking place on the bottom, the oxygen content of lake water is relatively low compared to that of running water. In some lakes, oxygen may decrease with depth, but there are many exceptions. These gradations of oxygen, light and temperature along with the currents and seiches, profoundly influence the vertical distribution of lake organisms (Smith 1974).

Distribution

Lacustrine habitats are found throughout California at virtually all elevations, but are less abundant in arid regions.

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Perennial Grassland

John G. Kie

Updated by: CWHR Staff, April 2005

Vegetation

Structure. Perennial Grassland habitats, as defined here, occur in two forms in California: coastal prairie, found in areas of northern California under maritime influence, and relics in habitats now dominated by annual grasses and forbs. The coastal prairie form is described here. Relic perennial grasslands are discussed in the chapter on Annual Grassland habitats (AGS). Species of perennial grasses are also common in Wet Meadow (WTM) and other habitats. Structure in Perennial Grassland habitat is dependent upon the mix of plant species at any particular site. For example, sites with western bracken fern exhibit a taller (to 1.5 m (5 fl)), more vertically diverse structure than those dominated by shorter grasses such as silver hairgrass (10-30 cm (0.3-1.0 ft)). Grazing by domestic livestock or wild herbivores such as Roosevelt elk can substantially alter habitat structure through reduction in plant height and removal of biomass. Average herbaceous production on nine soil series in Humboldt County was estimated to be 170013,000 kg/ha (1500-11,600 lb/ac) (Cooper and Heady 1964).

Composition. Perennial Grassland habitats are dominated by perennial grass species such as California oatgrass, Pacific hairgrass, and sweet vernalgrass. On northern sites near the ocean in Del Norte and Humboldt Counties, common species include California oatgrass, American dunegrass, goldfields, Kentucky bluegrass, and western bracken fern (Heady et al. 1977). Further inland, common species include redtop, silver hairgrass, sweet vernalgrass, English daisy, soft chess, coast carex, orchardgrass, California oatgrass, Idaho fescue, red fescue, Douglas iris, western bracken fern and red clover (Heady et al. 1977). To the south, at Point Lobos State Reserve in Monterey County, dominant species include silver hairgrass, coronaria brodiaea, soft chess, California oatgrass, Pacific hairgrass, snakeroot, gumweed, toad rush, poverty rush, common wood-rush, squawroot, and fiddle dock (Heady et al. 1977).

Other Classifications. Other classifications of Perennial Grassland are Coastal Prairie (Munz and Keck 1959, Cheatham and Haller 1975), Coastal Prairie-Scrub Mosaic (Küchler 1977), and Festuca-Danthonia grassland (Heady et al. 1977). Further, CALVEG (Parker and Matyas 1981) describes perennial grass in the North Interior, South Sierran and Southern Interior Ecological provinces. Perennial grass in each of these regions are more associated with the Wet Meadow (WTM) and Fresh Emergent Wetland (FEW) habitats in the North Interior; WTM, FEW, Lodgepole Pine (LPN), Eastside Pine (EPN), and Jeffrey Pine (JPN) in the South Sierran, and Joshua Tree (JST) and Desert Scrub

(DSC) in the South Interior. If perennial grass is encountered in any of these regions of the State, refer to the appropriate habitat description.

Habitat Stages

Vegetation Changes 1-2.S-D. Historically, factors that have affected Perennial Grassland habitats on the north coast include the introduction of non-native annual plant species, increased grazing pressure, elimination of frequent fires, and cultivation (Heady et al. 1977). Vegetation changes influenced by increased grazing, such as the spread of introduced annuals, were slower to occur on the north coast than in the central valley. Spanish missions did not extend north of Sonoma County, and the Russian settlements at Fort Ross and elsewhere on the north coast maintained few cattle and sheep. However, heavy grazing by Roosevelt elk and frequent use of fire by local Indian tribes may have influenced the successional stages of many Perennial Grassland habitats (Heady et al. 1977).

Duration of Stages. Heavily grazed Perennial Grassland habitat dominated by annual plant species returns to perennial species under reduction in grazing pressure. Heady et al. (1977) suggest a successional sequence of annual forbs, followed by annual grasses and perennial forbs, then by perennial grasses such as hairy oatgrass and common velvetgrass, and ending in a climax community dominated by sweet vernalgrass and Pacific oatgrass. On some sites, Perennial Grassland habitat may give way to Coastal Scrub habitat (CSC) dominated by coyotebush and lupine (Heady et al. 1977). Where Perennial Grassland habitat occurs on sites formerly supporting Douglas-fir (DFR), the establishment of perennial grasses may in some cases prevent succession back to the original forest cover (Gordon Huntington, pers. comm.).

Biological Setting

Habitat. Perennial Grassland habitat in the coastal prairie can be found adjacent to Douglas-fir (DFR), Redwood (RDW), Coastal Oak Woodland (COW), Closed Cone-Pine Cypress (CPC), Coastal Scrub (CSC), Saline Emergent Wildland (SEW), Estuarine (EST), Marine (MAR), Fresh Emergent Wetland (FEW), Valley-Foothill Riparian (VRI), Pasture (PAS), and all agricultural habitats.

Wildlife Considerations. Perennial Grassland provides optimum habitat for many species, including the common garter snake, western terrestrial garter snake (Houck 1979), northern harrier, barn owl, burrowing owl, western kingbird, Say's phoebe, barn swallow, western meadowlark, savannah sparrow, grasshopper sparrow (Harris and Harris 1979), Townsend mole, coast mole, Botta's pocket gopher, western harvest mouse, California vole, long-tailed vole, and Oregon vole (Mossman 1979). In addition, Perennial Grassland often serves as feeding habitat for the turkey vulture, red-tailed hawk, American kestrel, peregrine falcon, western bluebird (Harris and Harris 1979), fringe-tailed bat, big brown bat, striped skunk, coyote, black-tailed jackrabbit, brush rabbit, Roosevelt elk, and black-tailed deer (Mossman 1979).

Physical Setting

Perennial Grassland habitat typically occurs on ridges and south-facing slopes, alternating with forest and scrub in the valleys and on north-facing slopes (Heady et al. 1977). Perennial Grassland habitats are most often found on Mollisols. These soils may grade into Inceptisols to the north, with higher precipitation allowing for leaching of the mollic horizon, and into Alfisols to the south, under drier conditions. On the north coast, Perennial Grassland habitat may occasionally be found on Ultisols which formerly supported Douglas-fir (DFR) habitats, but which have been cleared by humans (Gordon Huntington, pers. comm.).

Climatic conditions are under strong maritime influence. Crescent City in Del Norte County has one of the wettest, coolest, most vegetatively productive climates in California (Major 1977). On the north coast, the length of the frost-free season in adjacent Douglas-fir (DFR) habitat is about 200 days (14 fortnights) (Garrison et al. 1977). Annual precipitation is highest in the north (Crescent City 1777 mm (70 in)), and lower to the south (Point Reyes, 497 mm (20 in); Monterey, 465 mm (18 in)) and inland (Davis, 418 mm (16in)) (Major 1977). Fog, which is common, reduces evapotranspiration, and greatly influences potential natural vegetation.

Distribution

Perennial Grassland habitat of the coastal prairie form occurs along the California coast from Monterey County northward (Küchler 1977). It is found below 1000 m (3280 ft) in elevation and seldom more than 100 km (62 mi) from the coast (Heady et al. 1977). Relic perennial grasses within annual grassland habitat occur in patches throughout the state.

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Riverine

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General Description

Structure-- Intermittent or continually running water distinguishes rivers and streams. A stream originates at some elevated source, such as a spring or lake, and flows downward at a rate relative to slope or gradient and the volume of surface runoff or discharge. Velocity generally declines at progressively lower altitudes, and the volume of water increases until the enlarged stream finally becomes sluggish. Over this transition from a rapid, surging stream to a slow, sluggish river, water temperature and turbidity will tend to increase, dissolved oxygen will decrease and the bottom will change from rocky to muddy (McNaughton and Wolf 1973).

Aquatic Environment

Composition-- The majority of fast stream inhabitants live in riffles, on the underside of rubble and gravel, sheltered from the current. Characteristic of the riffle insects are the nymphs of mayflies, caddisflies, alderflies, stoneflies; and the larva and pupae of true flies. In pools, the dominant insects are burrowing mayfly nymphs, dragonflies, damselflies and water striders. Water moss and heavily branched filamentous algae are held to rocks by strong holdfasts and align with the current. Other algae grow in spheric, or cushionlike colonies with smooth, gelatinous surfaces. Algae growth in streams often exhibits zonation on rocks, which is influenced by depth and current.

With increasing temperatures, decreasing velocities and accumulating bottom sediment, organisms of the fast water are replaced by organisms adapted to slower moving water. Mollusks and crustaceans replace the rubble-dwelling insect larvae. Backswimmers, water boatmen and diving beetles inhabit sluggish stretches and backwaters. Emergent vegetation grows along river banks, and duckweed floats on the surface. Abundant decaying matter on the river bottom promotes the growth of plankton populations that are not usually found in fast water.

Other Classifications-- Other classification systems of rivers and streams are: Riverine (Cowardin et al. 1979); Streams-10.2, Rivers-10.3 (Cheatham and Haller 1975) and Proctor et al. (1980).

Aquatic Zones and Substrates

The riverine habitat exists in structural classes 1;24:0-B. Open water (1) is defined as greater than 2 meters in depth and/or beyond the depth of floating rooted plants, and does not involve substrate. Small rivers and streams may not have an open water zone. The submerged zone (2) is between open water and shore. The shore (4) is seldom flooded (except for wave wash or fluctuations in flow) and is less than 10 percent canopy cover. For shorelines with 10 percent canopy cover or more, use a terrestrial habitat designation.

The rate at which a stream erodes its channel is determined by the nature of the substrate, composition of the water, climate and the gradient. The greater the slope, the greater the capacity to transport abrasive materials through increased velocity (Reid 196)

Most natural riverine systems are relatively stable over long periods of time as long as there is no human interference. The building of dams and the dredging and straightening of stream channels are in the most important factors controlling the duration of stream and river types.

Biological Setting

Habitat-- Riverine habitats can occur in association with many terrestrial habitats. Riparian habitats are found adjacent to many rivers and streams. Riverine habitats are also found contiguous to lacustrine and fresh emergent wetland habitats.

Wildlife Considerations-- The open water zones of large rivers provide resting and escape cover for many species of waterfowl. Gulls, terns, osprey and bald eagle hunt in open water. Near-shore waters provide food for waterfowl, herons, shorebirds, belted-kingfisher and American dipper. Many species of insectivorous birds (swallows, swifts, flycatchers) hawk their prey over water. Some of the more common mammals found in riverine habitats include river otter, mink, muskrat and beaver.

Physical Setting

Streams begin as outlets of ponds or lakes (lacustrine), or rise from spring or seepage areas. All streams at some time experience very low flow and nearly dry up. Some streams, except for occasional pools, dry up seasonally every year.

The temperature of the riverine habitat is not constant. In general, small, shallow streams tend to follow, but lag behind air temperatures, warming and cooling with the seasons. Rivers and streams with large areas exposed to direct sunlight are warmer than those shaded by trees, shrubs and high, steep banks.

The constant swirling and churning of high-velocity water over riffles and falls result in greater contact with the atmosphere-and thus have a high oxygen content. In polluted waters, deep holes or low velocity flows, dissolved oxygen is lower (Smith 1974).

Distribution

Rivers and streams occur statewide, mostly between sea level and 2438 meters (8000 fl).

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Wet Meadow

Raymond D. Ratliff

Vegetation

Structure-- Wet Meadows at all elevations generally have a simple structure consisting of a layer of herbaceous plants. Shrub or tree layers are usually absent or very sparse; they may, however, be an important feature of the meadow edge. Within the herbaceous plant community a microstructure is frequently present. Some species reach heights of only a few centimeters while others may grow a meter or more tall (> 3 ft). Except where broken by boulders, canopy cover is dense (60-100%). At the substrate surface, distances between individual shoots may vary from 1 or 2 mm (0.04-0.08 in) to as much as 2 or 3 cm (0.81.2 in) depending upon the species present.

Composition-- Wet Meadows occur with a great variety of plant species; therefore, it is not possible to generalize species composition. Species may differ, but several genera are common to Wet Meadows throughout the State. They include Agrostis, Carex, Danthonia, Juncus, Salix, and Scirpus. Important grass and grasslike species include thingrass, abruptbeak sedge, beaked sedge, Nebraska sedge, tufted hairgrass, needle spikerush, fewflowered spikerush, common spikerush, baltic rush, Nevada rush, iris-leaf rush, pullup muhly, and panicled bulrush. Important forbs include Anderson aster, Jeffrey shootingstar, trailing Saint-Johnswort, hairy pepperwort, primrose monkeyflower, western cowbane, American bistort, cows clover, and small white violet. Willow and bilberry are the only shrubs found in much abundance. Fewer species occur as surface water depth increases during spring runoff.

Other Classifications-- Poorly drained, closed-basin and moderately drained, closed-basin Wet Meadows were defined by Hormay (1943b). Bennett (1965) divided Wet Meadows into the Sphagnum, Coarse-leaved Sedge, Fine-leaved Sedge, and Grass subtypes. Subalpine or Alpine Moist-to-wet, Tule, and Wet meadow subformations were described by Hall (1979). Several series similar to this Wet Meadow classification occur within his subformations: Wet Meadow-Tall Sedge, Nebraska Sedge, Wet Meadow-Short Sedge, Wet Meadow-rush, and Wet Meadow-Spikesedge. Sedge and Wiregrass series were included in the graminoid subformation of the herbaceous formation in southern California (Paysen et al. 1980). Ratliff (1982) described five montane Wet Meadow series: Beaked Sedge, Ephemeral-lake, Hillside Bog, Nebraska Sedge, and Fewflowered Spikerush. Some of those series occurred in the subalpine as well. The most important subalpine Wet Meadow series was, however, the Shorthair Reedgrass.

Habitat Stages

Vegetation Changes--1;2:S-D. Generally, Wet Meadow communities succeed bog communities. In turn, Wet Meadows are succeeded by mesic meadows and by dry meadows or forest. Mesic and dry meadows may have a sparse cover of shrubs. Succession to coniferous forest is frequent at montane and subalpine elevations. At lower elevations, succession to broad leaved trees or shrubs, particularly sagebrush, may occur. Wood (1975) showed that succession of open meadow to forest and succession of forest to open meadow has occurred at the same location over geologic time. Therefore, Wet Meadows need not necessarily succeed to forest. Most Wet Meadow plant species are perennial, and a substantial change in the plant community may develop slowly. Differences in species composition between observations of Wet Meadow communities may therefore represent temporal fluctuations rather than successional trends. Perturbations that alter the Wet Meadow environment are usually necessary to set successional changes in motion. Overgrazed Wet Meadows have more forbs and fewer grasses and grasslike species than properly grazed or ungrazed (by livestock) meadows, and taller species are replaced by lower growing types. Channel erosion lowers the water table, causing succession to species of dryer habitats.

Duration of Stages-- The single most important characteristic of a Wet Meadow is its hydrology. Seasonality and reliability of yearly water inflows and outflows largely determine the vegetational stability of Wet Meadows. Therefore, Wet Meadow habitats exist indefinitely unless the hydrologic regimes are altered. Some meadows in the Sierra Nevada are at least 1200 years old (Wood 1975).

Biological Setting

Habitat-- Wet Meadows usually occur as ecotones between Fresh Emergent Wetlands (FEW) and Perennial Grassland (PGS) or mesic meadow types. Mesic meadows contain some species in common with Wet Meadows, and the distinction between wet and mesic meadows is not always clear. Where Wet Meadows merge with Fresh Emergent Wetlands, slight differences in water depth control the species present.

Wildlife Considerations-- In late summer, small mammals may visit Wet Meadows that have dried. However, the meadows are generally too wet to provide suitable habitat for small mammals. Mule deer and elk may feed in Wet Meadows, seeking especially forbs and palatable grasses. Waterfowl, especially mallard ducks, frequent streams flowing through Wet Meadows. Yellow-headed and red-winged blackbirds occasionally nest in Wet Meadows with tail vegetation and with adequate water to discourage predators (Storer and Usinger 1963). The striped racer is the common snake of Wet Meadows in the Sierra Nevada and Cascade Range. Various frog species are abundant in Wet Meadows throughout California. Six species of trout (Brown, cutthroat, golden, rainbow, eastern brook, and Mackinaw) inhabit streams of the Sierra Nevada (Storer and Usinger 1963), and presumably may occur in perennial streams of wet meadows. In the southern Sierra Nevada, the golden trout is the important fish of meadow habitats at high elevations.

Physical Setting

Wet Meadows occur where water is at or near the surface most of the growing season, following spring runoff. Hydrologically, they occupy lotic, sunken concave, and hanging sites (Ratliff 1985). Lotic sites (Gosselink and Turner 1978) are those with main input flow (other than precipitation) from upstream sources; at least early in the growing season, water flows across them at depths of 10 to 20 cm (4-8 in). Downstream runoff is the principal output flow. Lotic sites are topographic basins but have a slight slope, which permits drainage of surface water. Percolation is nil due to the saturated or slowly permeable nature of underlying materials. Sunken concave sites also receive water input from upstream sources, but evapotranspiration is the main output flow. Percolation is slowed by heavy-textured soils and/or shallow bedrock; however, in contrast to lotic and hanging sites, soil of sunken concave sites may dry to considerable depth by fall. Hanging sites are watered by hydrostatic flows as springs or seeps. They frequently occur on rather steep slopes, and downstream runoff is the main output flow. Surface flows, although constant, are usually no more than 1 cm (0.4 in) deep.

Distribution

Wet Meadows occur throughout virtually every forest type of the Sierra and Pacific Northwest floristic provinces and as inclusions in the northern coastal prairie and sagebrush steppe (Barbour and Major 1977). Where conditions are favorable, Wet Meadows occur in the Transverse and Peninsular ranges of Southern California. In the Sierra Nevada and Cascade ranges, Wet Meadows usually occur above 1200 m (3940 ft) in the north and above 1800 m (5900 ft) in the south. In the Klamath Mountains, Wet Meadows occur in the California red fir zone at 1400 m (4600 ft) to 1950 m (6400 ft) elevation. Swales in the valley and foothill grasslands occasionally provide conditions suitable for Wet Meadow species. However, because the vegetation is composed mostly of annual grasses and forbs and because the sites dry rapidly, these swales are not considered true Wet Meadows.

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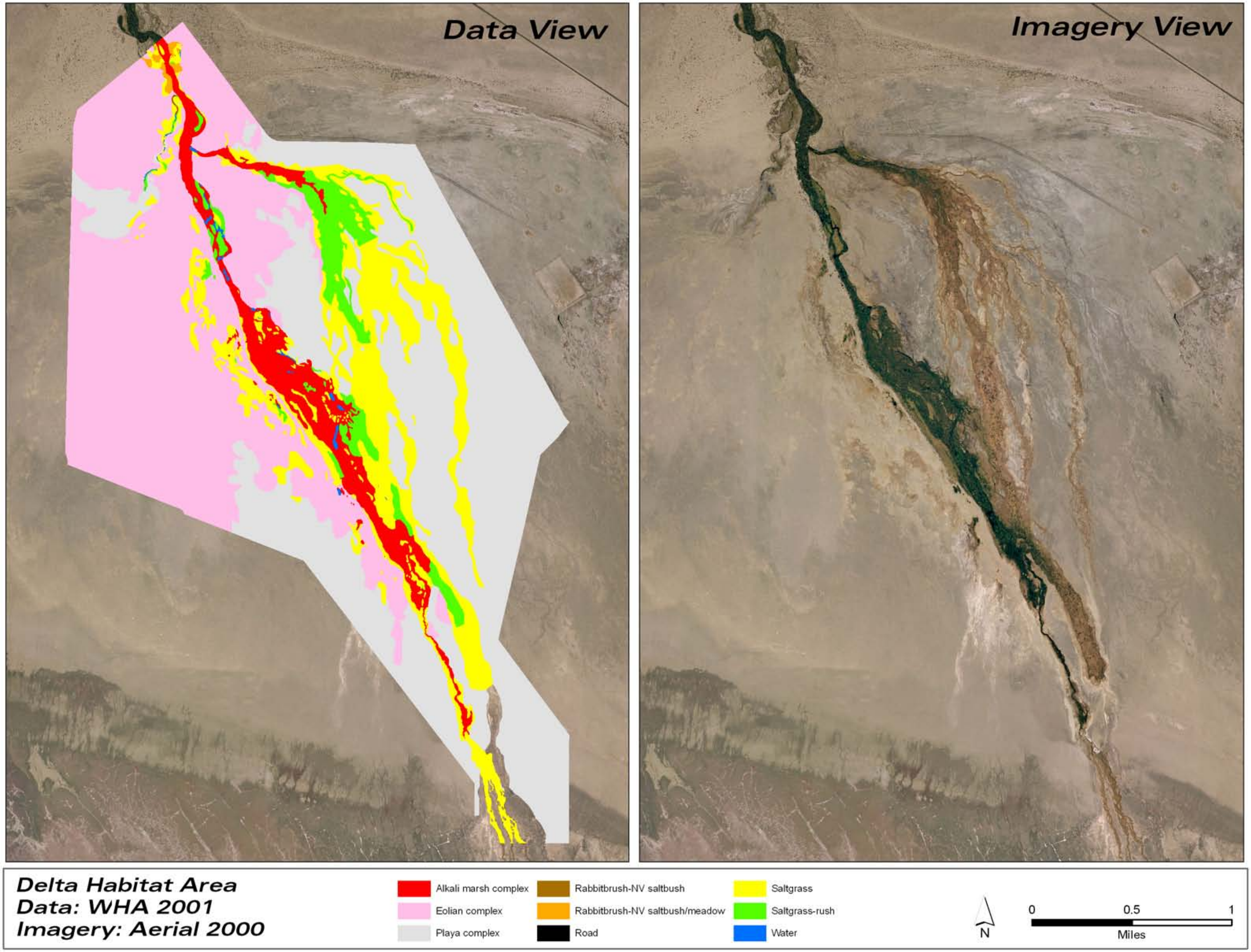
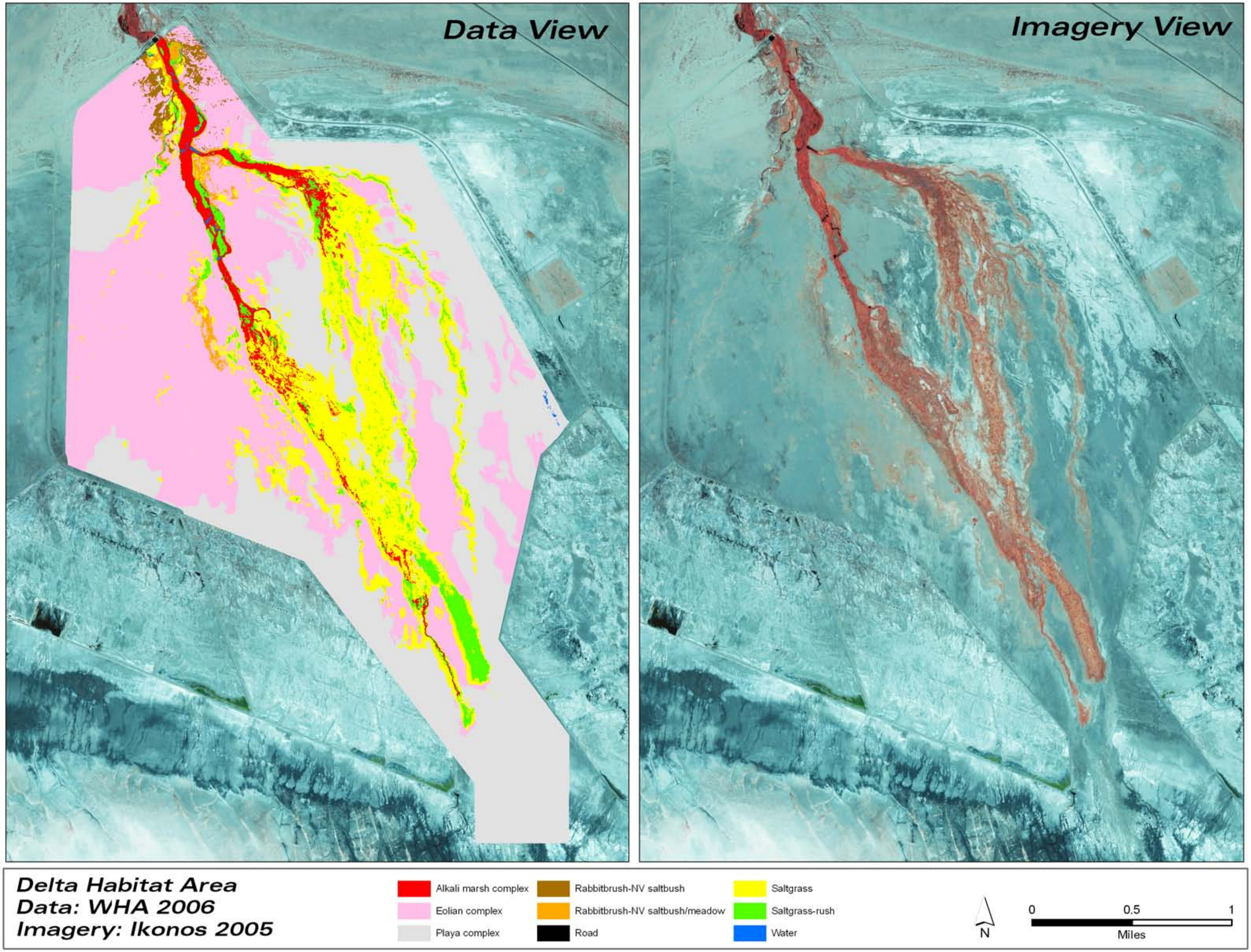
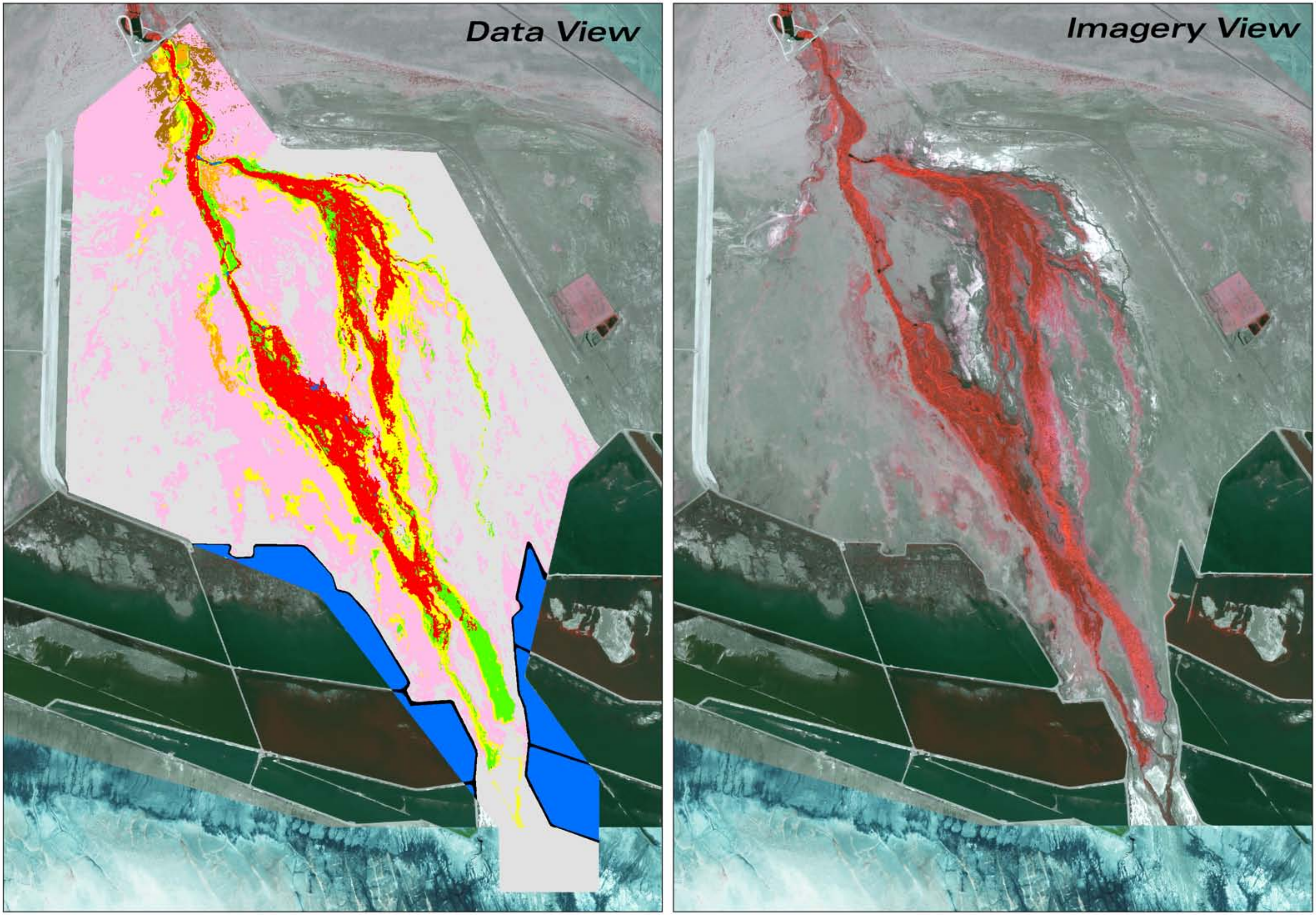
8.16.9. Appendix 9. Aerial Imagery



Data View
Imagery View
Delta Habitat Area
Data: WHA 2001
Imagery: Aerial 2000
Alkali marsh complex
Eolian complex
Playa complex
Rabbitbrush-NV saltbush
Rabbitbrush-NV saltbush/meadow
Road
Saltgrass
Saltgrass-rush
Water
N
0
0.5
1
Miles


Data View
Imagery View
Delta Habitat Area
Data: WHA 2006
Imagery: Ikonos 2005
Alkali marsh complex
Eolian complex
Playa complex
Rabbitbrush-NV saltbush
Rabbitbrush-NV saltbush/meadow
Road
Saltgrass
Saltgrass-rush
Water
N
0
0.5
1
Miles


Data View
Imagery View


Delta Habitat Area
Data: ES 2009
Imagery: Ikonos 2008
Alkali marsh complex
Eolian complex
Playa complex
Rabbitbrush-NV saltbush
Rabbitbrush-NV saltbush/meadow
Road
Saltgrass
Saltgrass-rush
Water
N
0
0.5
1
Miles

9.0 ADAPTIVE MANAGEMENT RECOMMENDATIONS

9.1. Executive Summary

The roles and responsibilities for collecting, analyzing and reporting monitoring data are described in the 2008 LORP Monitoring, Adaptive Management and Reporting Plan. Ecosystem Sciences, as the MOU Consultant, reviewed LADWP's and ICWD's 2009 Annual Monitoring Draft Report and developed adaptive management recommendations to ensure LORP goals are met in the four Lower Owens River management areas: the Riverine-Riparian Area, Blackrock Waterfowl Management Area, the Delta Habitat Area, and Off-River Lakes and Ponds. These recommendations are related to and build upon the adaptive management recommendations made in 2008.

The Adaptive Management chapter describes the progress made toward meeting LORP goals in 2009, identifies issues, and makes adaptive management recommendations for each LORP management area, the RAS and land/grazing management. This chapter also assesses the degree to which the 2008 adaptive management recommendations for the RAS were implemented, identifies issues that continue to be problematic in 2009, and provides recommendations.

Overall, progress was made toward attaining LORP goals in all management areas. In the Riverine-Riparian Area, woody recruitment was documented and cottonwoods and willows representing a variety of age classes were noted. During seasonal habitat flows inundation of critical landforms occurred, while water quality conditions remained at safe levels. Game fish were observed and are responding positively to management activities. The goals for water management in the Blackrock Waterfowl Management Area, Off-River Lakes and Ponds and Delta Habitat Area are being met with positive species response; overall, there was a significant increase in the total number of birds, number of species, and number of habitat indicator species in the Blackrock Management Area and Delta Habitat Area in 2009.

Issues identified in 2009 include: the continued proliferation of tules in the Riverine-Riparian Area; high concentrations of weeds (fivehook bassia, curlycup gumweed and pepperweed); exceedence of forage utilization standards; and insufficient utilization monitoring on some leases. In addition, review of the seasonal habitat flow analysis found errors in inundated acres; these discrepancies were resolved and the methods of analysis were improved upon. The adaptive management recommendations made in this chapter are intended to improve upon the monitoring and reporting process and ensure that progress is being made toward meeting LORP goals. The table below summarizes the recommendations by management area, RAS, and land/grazing management.

Adaptive Management Table 1. Summary of 2009 Adaptive Management Recommendations

Management Area	Recommendation and/or Action to be Taken
Riverine-Riparian Area	• Perform the river modeling when field surveys are completed. • Re-map landforms, including channel landform, to improve accuracy of monitoring seasonal habitat flow events. Re-mapping of landforms can be performed in conjunction with the flow modeling recommendation using current aerial photos and survey data. • During next year's seasonal habitat flow all plots need to be field measured with GPS tracking at high flows to verify mapping and flooded extent. • Timing the release of the seasonal habitat flow is important and should be decided by the Scientific Team as described in the LORP Monitoring, Adaptive Management and Reporting Plan. • There is no need to continue to monitor and report on river gains and losses. This can be done at any point in the future if needed. • The weed control program should use the data provided to it by other monitoring efforts, specifically the RAS. Future reports should include the utilization of these tools and an explanation of what adaptive management recommendations were considered or implemented. • Tamarisk brush piles should be chipped rather than burned in the future.
Blackrock Waterfowl Management Area	• Perform analysis of Thibaut Ponds habitat area. In the event monitoring and analysis show that more than 50% of the open water habitat has disappeared, it is recommended that Thibaut Ponds be slated for a controlled burn in the following winter. • Perform the avian census in the Drew and Waggoner units in the next two years to see if the initial response of habitat indicator species peaks in the first year and then declines, or if usage remains high.
Delta Habitat Area	• Until it can be shown that the current pulse flow plan cannot achieve all of the MOU goals, the adaptive management recommendation is to not make any modifications or changes to the current plan.
Off-River Lakes and Ponds	• No adaptive management actions are required.
Rapid Assessment Survey	• Curlycup gumweed could become a larger problem in the future. Ensure that all field personnel are well trained in identifying this plant, as well as all other previously identified exotic weeds. • The cut fence at river mile 28 and exclosure fencing should be repaired to ensure that grazing management plans are followed. • A more robust program to control pepperweed needs to be implemented immediately. • As resources are available, those roads identified in the RAS with the most severe impacts should be blocked. • The Tamarisk Control Program needs to integrate the RAS results into their efforts and document this integration.
Land/Grazing Management	• Testing bassia control with cattle trampling will be a multi-year effort using RAS, vegetation mapping and annual on-site evaluation to determine its effectiveness beginning in the next grazing season in the White Meadow Riparian Pasture. • The 4 miles of the east side of the Lone Pine leases need at least one, preferably more, range transects.
Other	• The LORP Data Warehouse needs to be established and populated with data as soon as possible. This will allow access to data by all MOU parties and will be a useful device for managing information without the need to include large amounts of data in the annual reports.

9.2. Adaptive Management Recommendations

The LORP Monitoring, Adaptive Management and Reporting Plan (2008) describes the roles and responsibilities of LADWP, ICWD and the MOU Consultant scientific teams (Section 3.3) for collecting, analyzing and reporting monitoring data. Adaptive management recommendations are made by the MOU Consultant for inclusion in the LORP Annual Report to the Standing Committee. The MOU parties (through an Advisory Committee) are consulted twice during the process: first following the completion of the draft Rapid Assessment Report and then when the draft Annual Report is complete.

Ecosystem Sciences has reviewed the draft Annual Report chapters as provided by LADWP and ICWD. Adaptive management recommendations are described below and are organized by LORP management area.

The LORP Annual Report measures project performance. The report recognizes project achievements, positive trends and successes, as well as shortcomings or unintended results. Ultimately, the report provides a balanced analysis that weighs current and past results with future goals in order to provide effective project guidance and shape adaptive management recommendations.

9.3. Riverine-Riparian Management Area

9.3.1. Progress toward Attainment of LORP Goals

***Habitat*:** Observations from the 2008 Rapid Assessment Survey (RAS) indicated over 200 sites where woody riparian plant species have established. Woody riparian species include willow and cottonwood, the key riparian plant species and habitat for indicator species. Establishment of woody riparian habitat was not anticipated because the LORP has yet to receive appropriate seasonal habitat flows. The first 200 cfs flow occurred in the winter of 2008, not in the spring, which was intended to remove sediment and improve water quality.

The first seasonal habitat flow, because of the low water year in 2009, was half the flow necessary to establish significant areas of woody riparian plants. Thus, it is simply noteworthy that riparian habitat is developing just from base flows and limited high flows.

The 2009 RAS found woody recruitment of willow and cottonwoods throughout the LORP (though at fewer sites than in 2008). Also of note are the several age classes of woody riparian species that are present in the LORP. The 2010 monitoring of habitat and vegetation is a robust and detailed program that will provide detailed information on habitat throughout the river corridor. A 2010 seasonal habitat flow of 200 cfs released during the right time in spring would also be of great benefit to accelerate the development of woody riparian habitat. Riparian habitat development is a key to LORP success.

Flow Management: The base flow has been successfully established and, because of the knowledge gained through seasonal changes (e.g., the effect of increasing and decreasing evapotranspiration, gaining and losing reaches, winter make-water), flow management can be predicted month to month. Monitoring of seasonal habitat flows indicates that the extent of inundation on critical landforms (sites where riparian habitat is expected to develop) exceeds predictions and that the river water table and groundwater remains high, even during base flows, sustaining small off-channel ponds and oxbows.

Water Quality: The 2008 and 2009 high flows did not create adverse water quality conditions or harm to the fishery, which was of great concern prior to LORP flow implementation. Three of the monitoring stations (Manzanar Reward Road, Reinhackle Spring Station and Keeler Bridge) experienced moderate drops in dissolved oxygen levels as the habitat flows passed these stations in 2009. Some of the stations experienced slight elevations of other water quality parameters, but none of the water quality thresholds were breached. Fish stress was not observed at any of the four water quality stations at any time during seasonal habitat flows.

Observations throughout all seasons provide anecdotal evidence that tules, although prolific and problematic, provide substantial filtering of suspended sediments in the water column. Frequently, river flows through the Intake carry substantial sediment loads from upstream erosion and bank sloughing. As these sediment-laden flows move into and through the Lower Owens River, the extensive tule areas act as a sediment filter, depositing them within the tule beds. Thus, in addition to habitat, tules also provide a useful service to improve water quality and build landforms. Of course, too many tules can also have adverse affects exacerbating water loss, reducing open water habitat, causing backwater flooding, choking the river channel and limiting access.

Fishery: One of the primary goals of the LORP is to establish and maintain a healthy warmwater fishery. The game fish of interest are largemouth bass, bluegill and catfish. Within months of introducing water to the dry upper half of the river, Owens River suckers and bass were observed throughout the channel. Fish colonized the upper river by upstream movement combined with migration out of the off-channel lakes and ponds via the newly created corridors linking the river, lakes and wetlands, and from the Middle Owens River through the Intake. Thus, not only has the fishery capitalized on the new habitat, but the linkages throughout the ecosystem are successful biological corridors. The creel census monitoring program scheduled for this next year will provide more specific data on catch rate, species, and size throughout the river.

9.3.2. Issues and Recommendations

Tules: The most pressing issue at this time is the proliferation of tules in the river corridor. Tules can be both valuable and detrimental depending on several factors. The 2008 LORP Annual Report addressed this issue with a lengthy discussion of the pros and cons of tules. Additional discussions about tules and their predicted development throughout the Lower Owens River can be found in WHA's 1997 Predicted Future Vegetation Types, the 2000 LORP Technical Memorandum #9, the 2004 EIR, and the 2008 Monitoring, Adaptive Management and Reporting Plan. In brief, tule growth and abundance appears to have met predictions and expectations.

Tule proliferation in the river channel is a problem for three reasons: First, the substantial volume of tules has a strong accelerating effect on evapotranspiration (ET) throughout the growing season. This is a significant water duty and exacerbates water loss from the Intake to the Pumpback Station. Water conservation is an important management responsibility and opportunities to save water should not be ignored. Second, tules exert a strong influence on flow dynamics. In reaches that have been narrowed by tules, such as from the Intake to Two Culverts, the velocity is quite high in the center of the channel. While this is not a negative influence it shows that tules can dramatically affect flow. Third, tules block access to much of the river at this time. While this is not an ecological or biological concern it does restrict or prevent recreational use for fishing and boating, which is a societal concern.

In 2008, the MOU Consultant's recommended that the tule problem be addressed by developing an up-to-date river model that will allow evaluating various flow scenarios. In response, LADWP initiated channel and geomorphic surface surveys to acquire the baseline data for the model, but the decision to use the data and perform the modeling was deferred.

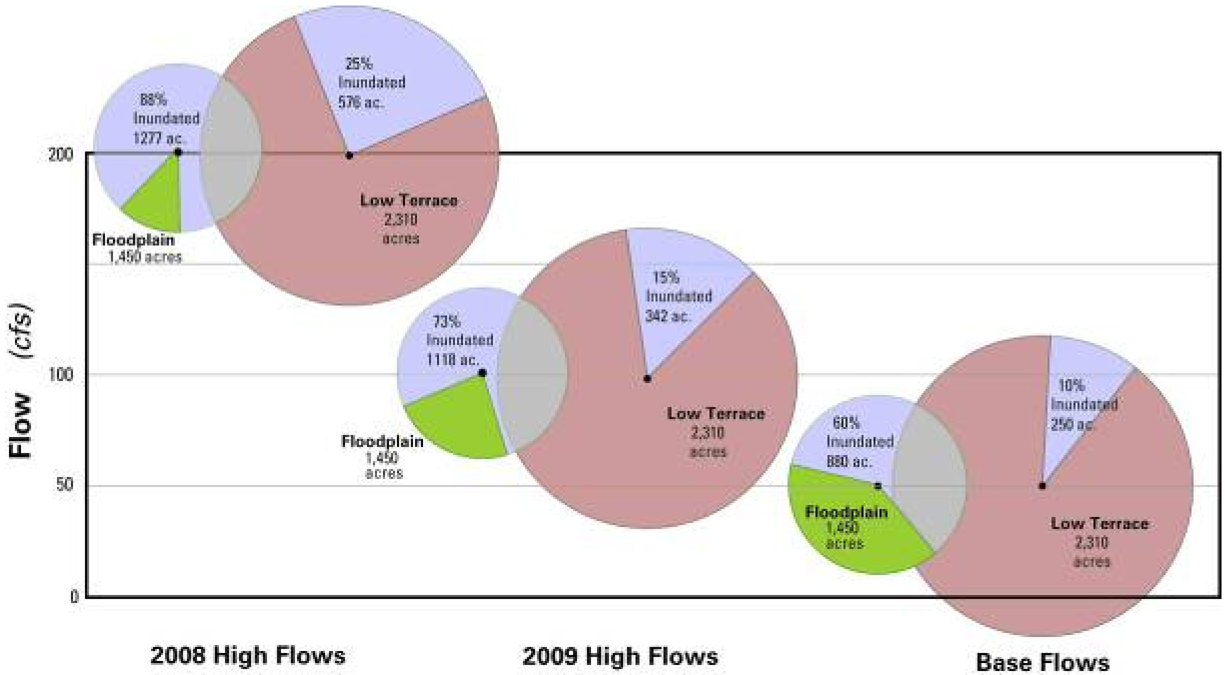
River flow, channel velocity, and channel geometry models combined with terrain and flow modeling technology will allow three-dimensional analysis and modeling of river depths in relation to channel landforms in several river reaches. The detailed scope for the field data acquisition and model were presented in the 2008 Adaptive Management Recommendations and in a Technical Memorandum "LORP River Flow Assessment and Flow Change Analysis".

Recommendation: Ecosystem Sciences recommends performing the river modeling when field surveys are completed. A detailed report on flow alternatives should be presented to the MOU parties so that various flow management scenarios can be reviewed and discussed, and adaptive management recommendations for future flows can be agreed upon. This recommendation is based upon the following factors:

- LADWP will have collected all the necessary survey data to perform the modeling, and the field data acquisition effort is the major cost factor.
- LADWP acquired high definition aerial photography for 2009; the same year in which field data has also been collected, which is a rare opportunity to have correlative data sets that allow very accurate descriptions and mapping extent of current tule conditions.
- Monitoring this spring and summer will include vegetation and habitat mapping, which will locate, quantify and verify all tule areas.
- Modeling flows with the combination of up-to-date survey data, aerial imagery, and vegetation mapping will establish a baseline from which all future flow evaluations can be made.

Seasonal Habitat Flow: Seasonal habitat flows are the primary management tool used to promote riparian vegetation establishment and growth at a critical time of year for the riverine-riparian system. With that in mind future seasonal habitat flow reports should carefully examine how flows accessed or did not access landforms that are critical to riparian development. After two years of documenting high flow events (2008 water quality flow and 2009 seasonal habitat flow), we find that certain aspects of the reporting and monitoring need to be changed to ensure accurate reporting.

The baseline Lower Owens landform map was created by White Horse Associates (WHA) in 2002. At that time much of the Lower Owens River channel was dry and WHA, correctly, did not map the "Channel Landform." Areas where channels existed and were wet, were mapped as floodplain. The WHA 2002 data, we have found, overestimates floodplain inundation as all wetted channels are mapped as floodplain. We believe that re-mapping the landforms of the Lower Owens River and including a channel landform would significantly aid in accurately monitoring seasonal habitat flow events. The figure below graphically explains the importance of correct and accurate landform mapping.



The figure shows the relative size of Low Terrace versus Floodplain, and the amount of inundation (both as percent and in acres) at 200 cfs, 100 cfs and baseflow. The figure illustrates the need for landforms of the Lower Owens River to be remapped. For example, at base flow 60 percent of floodplain landforms are inundated. If a channel landform was mapped, floodplain inundation at baseflow would be significantly less as much of the area mapped as floodplain would be re-mapped as channel. And, since the riparian ecosystem is dependent upon out-of-channel-flows, it is imperative to document where out of channel flows occur. Re-mapping landforms of the Lower Owens River would allow for baseflow inundation to be reset to 0 percent (versus 60 percent) and then high flow extent measured from that point. At present the existing landform classification may be indicating an artificially high inundation at base and high flows.

As the figure indicates, landforms accessed by both the 100 cfs flow (2009 seasonal habitat flow) and the 200 cfs flow (2008 water quality flow) had substantial quantitative values that can be extracted and reported in order to guide future decisions about flow management. One point in particular is the difference in landform inundation with the two flow events. Both Floodplains and Low Terrace are important landforms that will support riparian woody species development. Under baseflow conditions, a majority of the floodplain landform is inundated (60 percent or 880 acres). Increasing the flows to 100 cfs inundates 73 percent of floodplain landforms, an increase of 13 percent, while a 200 cfs flow increases inundation of floodplain landforms to 88 percent (an increase of 28 percent over baseflow). The total acreage of floodplain landform inundation increases by about 397 acres. Inundation of the Low Terrace landform also increases in flooded extent from 10 percent at baseflow to 25 percent at 200 cfs. The increase in flooded acreage from 250 acres at baseflow to over 576 acres at 200 cfs, is 326.

Another issue that we have identified that needs to be evaluated is the actual inundation of the Aggraded Wet Floodplain Reach (Reach 4). We believe the inundated acreage from the 2009 seasonal habitat flow is overestimated and our reticence to accept the inundated acreage is based primarily on the subjective nature of the analysis of Reach 4. This subjectivity needs to be removed to ensure that the effects of future seasonal habitat flows are documented correctly. For

2009, the most problematic issue is the use of an 85 percent multiplier in the Aggraded Wet Floodplain reach type (Reach 4). Based on a small flow increase (Reinhackle Flow Station 50 cfs base to 86 cfs high flow) of only 36 cfs, the extrapolation multiplier could be no more than 67 percent, and possibly less. Using an extrapolation multiplier of 67 percent reduces the floodplain flooded area in the aggraded wet floodplain reach type by roughly 73 acres (344.1 – 271.3). This type of error compounds error within the entire report resulting in an overestimation of actual inundation. Continuing this trend could result in exponential error over time. Thus, we feel that incorporating a field verification of base and high flow inundation within Reach 4 is a necessary component of future seasonal habitat flow monitoring. Monitoring and reporting of inundation in Reach 4 could also benefit from re-mapping the landforms as mentioned above.

GIS is an important tool in the process of analysis and reporting. Review of actual GIS files and databases should be conducted in addition to the review of the summarized data, map outputs and reporting. Errors in GIS analysis are common and can lead to misinterpretation, compounded error through time, and disorganized databases.

As of yet, the project has not experienced a 200 cfs flow at the right time of year. Scientists have not been able to see or evaluate a normal year seasonal flow during the spring and concurring with maximum riparian seed drop. Additionally, extensive tule growth in the river channel since project inception has modified channel capacity and water flows. It is unknown what difference extensive tule growth will have on future 200 cfs flows. In the event the pattern of low water years continues, consideration should be given to alternative ways to achieve a 200 cfs peak flow. Project scientists could examine the volume of water allocated to each seasonal habitat flow based on the water year and reallocate that water over a compressed time frame that ensures a 200 cfs peak is released from the Intake. As described above, the Low Terrace landform is an abundant and important landform type within the LORP. Increasing flows to 200 cfs, even over a short duration, would increase the flooded area considerably by accessing the Low Terrace landforms. Doing so could “jumpstart” riparian vegetation on a landform that is dominated by more xeric vegetation types.

Each year the MOU Consultant is required to make a recommendation to the Standing Committee for the seasonal habitat flow based on the predicted water year. It is at this time that any recommendation to alter the seasonal habitat flow such as described above will be made. However, prior to making any recommendation, LADWP and ICWD will be consulted as to the feasibility and constraints necessary to make such adjustments to the seasonal habitat flow.

Recommendations: Timing the release of the seasonal habitat flow is important and should be decided by the Scientific Team as described in the LORP Monitoring, Adaptive Management and Reporting Plan. Two years of high flow events have not captured the timing of seed drop and dispersal. The Scientific Team would consider seed development and drop, weather conditions, time of year, and other ecological and climatic conditions, and then determine the time to begin flow releases. This should be decided by field reviews throughout the entire river channel system. The release of the flows will be variable, and logistical and operational tasks must remain flexible and ready to respond to quick decisions to release the seasonal flow.

Next year all plots need to be field measured with GPS tracking at high flows to verify mapping and flooded extent. Only doing three of the five plots does not give quality data for the entire river, especially given the need to extrapolate data from these plots to the entire system. The plots are representative of the varying river reaches and represent how high flows will act throughout the river. Field verification through direct on the ground measurement and verification is an important part of the process. Remote imagery collected from the helicopter and the GIS analysis is greatly improved by the plot measurements.

Re-mapping the landforms of the Lower Owens River and including a channel landform would significantly aid in accurately monitoring seasonal habitat flow events. Re-mapping of landforms can be performed in conjunction with the flow modeling recommendation using current aerial photos and survey data.

Flow Gains and Losses: Flow gains and losses occurring in the Lower Owens River were assessed for 2008 and 2009 flows. The 2008-2009 gains and losses were compared to losses and gains reported for 2006 to 2009. The 2008-2009 analysis successfully evaluated annual river gain and loss from the Intake to the Pumpback Station. Annual and seasonal gain and losses by river reach and within river reaches is provided. LADWP has isolated changes in flows resulting from river gains and losses by year, seasons and daily flow discharges.

Recommendation: There is no need to continue to monitor and report on river gains and losses. If in the future this type of analysis is needed for management purposes, losses and gains could again be reported. This would be possible since LADWP records daily flows at flow monitoring stations located in key river reaches. The daily flow data collected are stored for future use. A possible exception to this would be if the Lower Owens River received an abnormal flood event. It may be helpful, then, to do a gain-loss analysis for refining future needed flow predictions.

Hydrologic Monitoring: Overall the hydrology report is well done (more discussion of the data would be a welcome addition), and we offer the following comments for future reports:

Section 6.1, River Flows, is the appropriate place to add a discussion of losing and gaining reaches of the LORP. This type of analysis could aid future adaptive management recommendations.

Section 6.2, Flows to the Delta, could benefit from a discussion describing precipitation events and their effect on flows to the Delta. Figure 2 shows several spikes in flow prior to the seasonal habitat flow and the September pulse flow. These spikes should be explained.

The Blackrock Waterfowl Area, Section 6.5, experienced significant changes since the project started. The drying and wetting of cells should be further explained.

Additionally, all graphs describing acreage in each BWMA cell should contain inflow data. Plotting inflow data with acreage data will aid project decision makers in understanding the relationship between inflow and acreage in the BWMA.

Section 6.6, Groundwater Effects of the LORP, presents very important data for the LORP. The section could be strengthened by adding the following:

- A discussion of LADWP's groundwater pumping schedule and its effects on groundwater in the LORP.

- Adding points to the graph showing when pulse flows have occurred to illustrate the effect of pulse flows on groundwater levels.

Recommendation: No adaptive management recommendation is required.

Weed Control: The Agriculture Commission receives $150,000 per year for treatment of perennial pepperweed. The office surveyed 44,747 acres of the LORP and was able to treat 242 acres; 132 visits were made to all of the sites. None of the existing sites have been eradicated and new sites have been discovered. Little detail as to the timing and specific locations treated is presented.

The Annual Report states that the 2008 Inyo County Water Department Salt Cedar Treatment Program effort focused on areas near Billy Lake. The 2008 RAS Adaptive Management Recommendations, however, prioritized river sites, especially tamarisk seedling sites. Maps and GIS files of tamarisk seedling locations which occurred with native woody recruitment were supplied to Inyo County and LADWP. Meetings were held and data transferred to ensure that the program was aware of these locations and that they would be prioritized; however, this was not done during 2009.

The Annual Report indicates that the 2009 RAS results have been received, and that the stretch from the Intake to Billy Lake Return will be prioritized in order to treat resprouts. Given the size and scope of this program, the report lacks specificity and does not demonstrate utilization of data generated from other monitoring efforts. GPS and GIS data on tamarisk locations are available and have been transmitted to this program.

Recommendations: The Weed Report lacks specific detail, does not demonstrate the current available tools (e.g. GIS and GPS), and is generally weak when compared to other sections of the Annual Report.

We recommend that LADWP review and expand its efforts to treat pepperweed sites and/or increase funding to the Agriculture Commission. If funds are limited, a re-prioritization of weed treatment may be useful, i.e. transfer funds slated for use in treatment of Russian olive to pepperweed control.

The weed programs should use the data provided to them by other monitoring efforts, specifically the RAS results. Agency personnel have spent field and office time to generate these data sets specifically for their application in management actions. Future reports should include the utilization of these tools and an explanation of what adaptive management recommendations were considered or implemented. For example, previous recommendations included prioritizing tamarisk seedling sites that coincide with woody recruitment sites. When recommendations are not followed through with, an explanation should be provided.

Additionally, we recommend that tamarisk brush piles should be chipped rather than burnt in the future. Burning creates disturbed areas conducive to additional salt cedar invasion. Burning slash is also a slow process, expensive, and risky. Using up-to-date chippers or masticators to mulch slash piles will be cheaper, safer, and faster. Chipping was tested some years and found to be effective provided the right equipment is used.

9.4. Blackrock Waterfowl Management Area

9.4.1. Progress toward Attainment of LORP Goals

Water and Acreage Management: The waterfowl areas were rotated for the 2009-10 runoff year, with Thibaut and Winterton being taken out of service and Drew and Waggoner being flooded. Due to the April 1 runoff forecast (71percent of normal) the goal for total average wetted acreage was 355 acres. Through the fall of 2009 (the mid-fall measurement was taken in September), the average wetted area for the year was 373 acres. While an efficient and accurate method to measure the wetted areas of the wetland cells is still being determined, management has shown that the units can be managed (flooded and maintained) to meet annual requirements.

Habitat Indicator Species: Large numbers of wetland birds were documented throughout the Drew unit, including flocks of ducks and shorebirds in the flooded shrubland. In fact, this year's count shows a significant increase in total number of birds, number of species, and number of habitat indicator species as compared to baseline counts conducted in 2002 and 2004 during the same time of year. A total of 35 avian species were present, 17 of which were habitat indicator species. The most abundant species was Mallard. Hundreds were seen scattered throughout the flooded grasslands. Small flocks of American Wigeon were seen in the tules and flooded shrubland. Herons, Egrets and White-faced Ibis were foraging in the wet meadows. Scores of Sora were heard calling among the tules. Red-winged Blackbirds were constantly in motion flying overhead, while Yellow-headed Blackbirds were calling from the tules and flooded shrubland. American Avocets and Greater and Lesser Yellowlegs were seen foraging in the flooded grasslands and shrublands. Large numbers of Savannah Sparrows were detected along the edges of the flooded grassland. Five Wilson's Snipes were observed in the flooded grassland.

A total of 36 avian species were documented in the Waggoner Unit, 12 of which were habitat indicator species. Three of the habitat indicator species counted were waterfowl; no waterfowl were reported in the previous baseline count. This year there were over 100 American Wigeon found with Cinnamon Teal and Mallards. Red-winged Blackbird was the most abundant species detected flying over or calling from the tules. Sixty six Yellow-headed Blackbirds were counted as well. Many Bank Swallows were seen flying over the Waggoner Unit. Over one hundred American White Pelicans were seen soaring in spirals over the wetlands. There were large numbers of Marsh Wrens and Common Yellowthroats in Waggoner among the tules. Because of the adjacent woodlands, other species were seen in Waggoner adding to the species richness. Woodland species such as Black-billed Magpie, American Goldfinch, Yellow Warbler, American Kestrel and Warbling Vireo were also detected. During the 2002 and 2004 counts at Waggoner no waterfowl were found. During this one visit there were 180 ducks using the site. The burn earlier in the year improved habitat by creating open spaces in the tules for waterfowl.

9.4.2. Issues and Recommendations

Inflow and Acreage Management: Thibaut Ponds is mandated to remain at 28 acres regardless of the water year or the wetland areas in the other units. The original intent behind this was to ensure open water habitat would be available to waterfowl even as other units were drying or filling in with vegetation. Unfortunately, Thibaut Ponds themselves, because of their shallow depths, are filling with tules and open water has declined significantly.

Recommendation: Vegetation and habitat mapping will be a 2009-2010 monitoring effort. These data, combined with a review of past areas of water and vegetation in Thibaut Ponds, will reveal how much and at what rate open water habitat has declined. In the event monitoring and analysis show that more than 50% of the open water habitat has disappeared, it is recommended that Thibaut Ponds be slated for a controlled burn in the following winter.

Avian Census: While bird monitoring in the BWMA was not required this year under the LORP Monitoring and Adaptive Management Plan, LADWP conducted a single day bird census in the Drew and Waggoner Units approximately four months after the initiation of flooding. Both units were burned in February of this year to remove thick decadent stands of emergent vegetation and shrubs, prior to the release of water in April. Large numbers of water birds have been using the units since at least May. This brief census provides some documentation of the response of birds to the management actions taken in BWMA. LADWP thought it was important to record bird use of burned and newly flooded units before dense emergent vegetation dominated the area. The data indicate a rapid response by habitat indicator species, as well as other waterfowl and wading birds, to the thinning of vegetation and creation of open water areas.

Recommendation: Conducting avian censuses in the first year of wetland change over from one unit to another appears to provide valuable information on initial responses of habitat indicator species, which would be useful in modifying and refining wetland management. A short-term metric such as this would provide insight into the occurrence and magnitude of bird usage in the first years of wetland development. Since the fundamental goal in the BWMA is to provide habitat, not just wetted acreage, avian census data is a strong indicator of habitat quality without the effort and cost of detailed habitat suitability mapping. Since it has been shown that useful data can be obtained with minimal effort (a one or two day survey), it is recommended to perform the avian census in the Drew and Waggoner units in the next two years to see if the initial response of habitat indicator species peaks in the first year and then declines, or if usage remains high. If, for example, it is found that bird usage peaks in the first year of change over, and rapidly declines over the next few years, if may suggest that management of wetland units would be better with more frequent drying and wetting cycles.

9.5. Off-River Lakes and Ponds

9.5.1. Progress towards Attainment of LORP Goals

***Water Level Management*:** The goal for the Off-River Lakes and Ponds is to maintain Upper Twin Lake, Lower Twin Lake, and Goose Lake water surface elevations between 1.5 and 3.0 feet on their existing staff gages, and keep Billy Lake full (i.e., at an elevation that maintains flow from the lake). From October 2008 to September 2009, none of the gages indicated levels below 1.5 feet.

9.5.2. Issues and Recommendations

Water Level Management: All of the Off-River Lakes and Ponds, including Thibaut Ponds and Billy Lake were in compliance without experiencing any operational difficulties.

Recommendation: No adaptive management recommendations are required.

9.6. Delta Habitat Area

9.6.1. Progress toward Attainment of LORP Goals

Habitat: Analysis of current conditions shows that the primary changes in the Delta Habitat Area (DHA) since LORP implementation is the conversion of about 196 acres of saltgrass habitat to alkali marsh. The number of vegetated wetland acres decreased by 40, which is a less than 5 percent reduction from 2005 levels, and within an expected mapping and conversion error range. Overall, compared to 2005, the DHA has become more dominated by hydrophilic vegetation, with roughly the same extent. Thus, the minimum trigger of vegetation change has not been exceeded.

Habitat Indicator Species: A total of 151 species have been encountered in the Delta Habitat Area, including 77 species along the Delta East Route and 93 species along the Delta West Route. Forty-six of these species are designated habitat indicator species for the Delta.

Overall bird use of the DHA since implementation of the LORP has increased. Passerine and waterbird species appear to have benefited from changes that have occurred since implementation. The apparent qualitative changes in habitat conditions have affected the various groups of habitat indicator species differently. A positive response has been seen from habitat indicator species associated with alkali marsh habitats – namely rails and bitterns. Long-legged wading species such as White-faced Ibis and egrets that use wet meadow habitats also appear to be using the DHA more frequently. Waterfowl use of the area is likely more consistent through the summer and fall as compared to pre-project conditions, due to increased water availability. However, spring use was less in 2009 compared to the 2005 baseline census. Areas of the DHA used by waterfowl in 2005 were more vegetated in 2009, with fewer shallow open water areas. Changes in use by shorebirds as compared to pre-project conditions are less apparent.

9.6.2. Issues and Recommendations

Habitat: The current conditions of the DHA are different from baseline conditions. Most noticeable is the presence of Owens Lake dust control cells within the boundary of the DHA. Between 2005 and 2008 the LADWP completed the dust mitigation cells that bracket the DHA and initiated their wetting and drying cycles. When the Quickbird Imagery was taken in September 2008 and when field surveys were performed in summer 2009, the dust control cells were filled with water. Thus, the extent of open water in the DHA in 2008 (247.0 acres) is significantly more than baseline conditions (4.4 acres). Yet, 245 acres of open water in 2008 is contained with the Dust Mitigation Project's cells. Therefore, within the vegetated wetland area of the DHA, open water actually decreased compared to baseline conditions (from 4.4 acres to 2.0 acres).

The decrease in open water in the DHA between 2005 and 2008 is most likely attributable to the proliferation of Alkali marsh complex. Alkali marsh is a vegetated wetland that is often permanently flooded or saturated. Thus, the increase in the flow of water to the Delta since the onset of the LORP enabled Alkali marsh to establish in areas that were previously too dry. These areas now inhabited by Alkali marsh used to be dominated by saltgrass associations. Thus, the overall area inhabited by saltgrass association types decreased by 263 acres between 2005 and 2008. The number of wetland acres in the DHA also decreased from 755.2 acres in 2005 to 685.4 acres in 2008. The decrease in wetland cover is associated with the decrease in the saltgrass association.

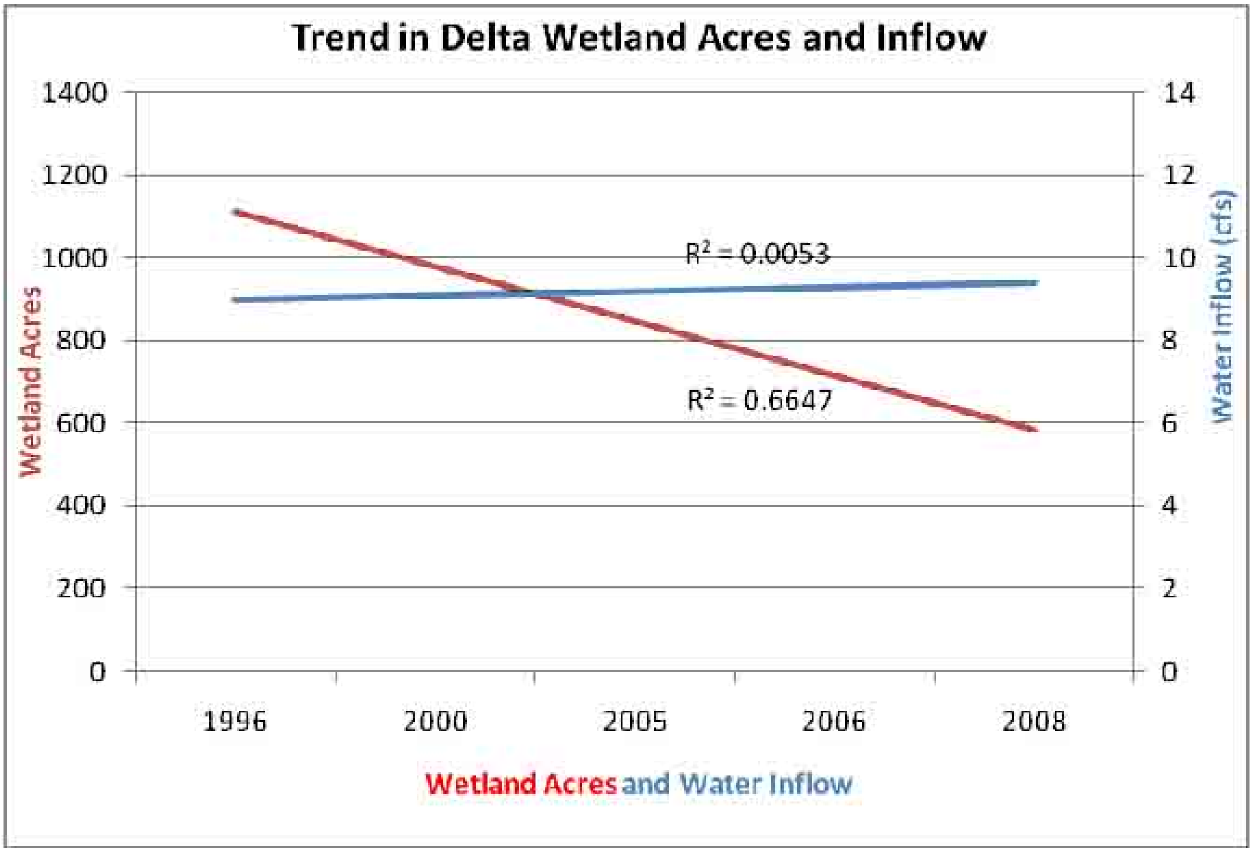
The most notable change in target species habitat between 2005 and 2008 was the increase by 194 acres of Fresh Emergent Wetland (FEW) habitat. This increase is attributable to the continuous flow to the DHA since the implementation of the LORP, allowing Fresh Emergent Wetland to colonize areas that previously lacked the soil moisture or water availability. This increase in Fresh Emergent Wetland caused the Perennial Grassland habitat to decrease, as much of the area that the Fresh Emergent Wetland Habitat colonized was previously occupied by Perennial Grassland.

Overall habitat diversity in the DHA increased between 2005 and 2008. In 2005 the habitat diversity of the DHA achieved a value of 1.2; while in 2008 the DHA diversity value increased to 1.4. These two data points, although a low sample size, indicate that the DHA is trending towards increased diversity. It can be assumed that project management actions (i.e. established base flow, supplementary flow to the DHA from the LORP seasonal flow, and seasonal pulse flows to the DHA) have caused the DHA to trend towards a more diverse landscape.

A detailed analysis of changes in vegetation type and extent is given in Chapter 8.

Recommendation: Based on the assessment shown in Chapter 8, it was concluded that until it can be shown that the current pulse flow plan cannot achieve all of the MOU goals, the adaptive management recommendation is to not make any modifications or changes to the current plan. However, as shown in the figure below, there is a definable downward trend in wetland area since

1996. Future monitoring will determine if this trend continues, and whether it is correlated with inflow.



9.7. Rapid Assessment Survey

9.7.1. Issues and Recommendations

Exotic Weeds: Fivehook bassia *(Bassia hyssopifolia)* continues to be a major issue in the LORP, three years following rewatering. The *Bassia* is not only inhibiting riparian development, but it is hampering the ability of the RAS to accurately monitor certain areas due to its high concentration and the difficulty of penetrating infested areas.

Recommendation: The recommendations for *Bassia* treatment can be found under the land management section of this report.

Curlycup gumweed (*Grindelia squarrosa)* is a plant that has not yet been classified by regulating authorities, but exists in the LORP and could potentially pose a future problem.

Recommendation: Curlycup gumweed could become a larger problem in the future. Ensure that all field personnel are well trained in identifying this plant, as well as all other previously identified exotic weeds.

Fencing: A fence was cut at river mile 28. The Lone Pine exlosure's bottom wire is too high at the northwest corner of the exclosure and will allow calf access. The west side (river side) of the Delta exclosure is not extended far enough into the river channel and cows have access around the fence. A log placed there is not adequate to exclude livestock. The fence on the north end of the Thibaut exclosure has stays missing and a weakened fence may allow cattle access.

Recommendation: The cut fence at river mile 28 and exclosure fencing should be repaired to ensure that grazing management plans are followed.

Noxious Weeds: Perennial pepperweed (*Lepidium latifolium*) has continued to infest areas of the LORP. Areas that were documented in the past have persisted or expanded; new infestation locations were also documented. Perennial pepperweed is a very difficult plant to control once established.

Recommendation: This is one of the most important resource management issues in the LORP, and it must be addressed. Although the Inyo County Agricultural Commissioner (ICAC) is responsible for treatment, any and all possible resources need to be utilized to control this plant. LADWP and Inyo County need to either provide more funding to the ICAC, or supplement the efforts of the ICAC with their own contingency monitoring and treatment.

Roads: Limited additional road creation and impacts were noted in the RAS. A few priority road points include riparian habitat impacts.

Recommendation: As resources are available, those roads identified in the RAS with the most severe impacts should be blocked. LADWP, Inyo County and Ecosystem Sciences should identify priority areas and appropriate methods.

9.8. Response to Implementation/Integration of 2008 RAS Adaptive Management Recommendations

In general, LADWP and Inyo County did well at integrating our recommendations, including the report composition, data organization and management, categorization of data, grazing management issues, tamarisk data entry and organization, tamarisk slash, roads, and trash issues.

LADWP and ICWD failed to implement our recommendations on fivehorn smartweed and perennial pepperweed. Rather than instituting one of the established methods for control of fivehorn smartweed, they allowed increased grazing outside of the grazing management plans to "increase trampling". There is no indication as to whether this was effective and to what extent. We recommended development of a study plan to control and monitor this issue. The effects of this infestation are detailed in the comments above.

Recommendation: Develop a study plan to treat and monitor the success of the treatment on selected areas as detailed above and in the 2008 Adaptive Management Recommendations. The current treatment method has no apparent way of tracking the effectiveness of relaxing utilization standards.

Perennial pepperweed is one of the most significant threats to the success of the LORP as stated above.

Recommendation: Take more aggressive action to control this invasive weed. Recommendations are detailed above.

Tamarisk seedlings were identified as an issue that should be addressed. The Tamarisk Control Project was notified about the location of seedlings but there is no evidence that they took any specific action as a result of the RAS.

Recommendation: The Tamarisk Control Program needs to integrate the RAS results into their efforts and document this integration. The LORP management program is intended to be integrated; the purpose of recording and transmitting results from the RAS is so that the organizations can use the information to address the issues that are identified.

9.9. Suggestions from LADWP and Inyo County Staff for Future RAS Implementation

In general, the recommendations made by staff will improve future RAS efforts. Over the first three years of the RAS effort, refinements in methods and reporting have improved the overall usefulness of the effort. A few items need clarification, or review of their usefulness.

It is recommended that mature tamarisk plants are recorded every 5 years. As such, field personnel are measuring trees that have been recorded multiple times in the past. This is logical; however, the protocols and data collection methods change over time, limiting the ability to compare results.

It is also recommended that the condition of whether tamarisk plants are flowering, not be recorded. It is not clear what this additional information provides and how it informs any possible management responses. Similarly, it is unclear what the management implications are for identifying and recording age class of tamarisk plants (Add Age Class Field) in the RAS effort.

Recommendation: Carefully identify what management actions might be informed by gathering the additional information described above before instituting these changes.

9.10. Land Management

9.10.1. Progress toward Attainment of LORP Goals

All of the LORP lessees have implemented their individual grazing plans. At this time grazing management is progressing and refinements to the plans are being made as needed. All of the fencing of riparian and upland pastures throughout the LORP has been completed.

9.10.2. Issues and Recommendations

Range trend examines differences over time, compared to baseline conditions. All grazing leases in the LORP area were being monitored for trends except the Intake Grazing Lease. Range trend monitoring was initiated on the Intake Grazing Lease in 2009. Range trend monitoring methods cover the necessary attributes and can be compared to “Reference Plant Communities” if needed. Range trend monitoring and analysis, however, does not cover river banks or stream banks. These habitat types will be covered by other analysis techniques. Because range trend can respond slowly to changes in management, and high influence is exerted by climatic controls, numerous years may be needed to draw valid conclusions on some pastures and fields. Range trend sampling and analysis is proceeding well and should continue.

LORP rangeland baseline condition monitoring began in 2002. The Monitoring and Adaptive Management Plan states, "All rangeland monitoring conducted from years 2002 through 2007 will be considered baseline". All baseline data should be recorded in the 2009 report so there is a more complete database to analyze and assess change over time.

Many fields and pastures in the LORP area are being grazed to less than 2 inch stubble height. This is allowed under prescribed utilization standards. Because of low remaining stubble heights, it is especially important that utilization standards are not exceeded. Monitoring methods should be reevaluated and updated as needed to make methods more responsive to the lessee and range specialists' needs. Knowing when forage utilization has reached mandated standards and, in turn, livestock moved from the field, is the key management tool presently available.

9.10.3. Recommendations by Grazing Lease

Island Grazing Lease

There is no Island 12 utilization transect on the lease map. No data is presented for this transect. We complained that Island 07 transect was insufficient, by itself, to cover such a large area. DWP responded that Transect 12 is adjacent to 07 and provides additional data. It would be helpful to display this data.

Blackrock Grazing Lease

Concentrated hoof action is proposed by LADWP to churn soils and break up smother weed (Basia) dominated areas in the White Meadow Riparian Pasture. To get the necessary intensity of hoof trampling of vegetation, lease required grazing standards will be ignored. This will require utilization standards for the White Meadow Riparian Pasture to be exceeded. High hoof trampling of vegetation and soils can be a productive management tool if done properly.

Under adaptive management such short-term interventions can be implemented, but require careful evaluation. Testing bassia control with cattle trampling will be a multi-year effort using RAS, vegetation mapping and annual on-site evaluation to determine its effectiveness beginning in the next grazing season in the White Meadow Riparian Pasture.

Lone Pine Grazing Lease

The West Depot Riparian Field contains no utilization monitoring transects. Because the river, along the east border of this field, suffices as a fence, this area becomes a separate management pasture. This area needs to be monitored with at least one utilization transect. The lease map lists a Depot Riparian Field, but does not show a boundary for this field. This boundary should be displayed.

10.0 RESPONSE TO COMMENTS

10.1. Sierra Club and Owens Valley Committee Comments

January 18, 2010

From: Mark Bagley, Sierra Club MOU Representative and OVC Legal and Policy Liaison
Peter Vorster, Consulting Hydrologist for Sierra Club and OVC

To: Gene Coufal, LADWP Aqueduct Business Group Manager
Bob Harrington, Inyo County Water Department Director
Mark Hill, Ecosystem Sciences

VIA EMAIL (signed hard copy to be mailed)

Subject: Sierra Club and OVC comments on LORP 2009 Annual Monitoring Draft Report

These comments on the LORP 2009 Annual Monitoring Draft Report are being submitted on behalf of the Sierra Club and the Owens Valley Committee (OVC). They were prepared by us with input from Dr. Duncan T. Patten. Our comments are offered with a constructive intention in order to help move us toward achieving the project goals in an efficient and timely manner.

We appreciate the considerable efforts that went into the monitoring effort and preparation of this report and for the many improvements made since last year. We also appreciate your consideration of our views.

I. Seasonal Habitat Flows and the Recruitment of Riparian Vegetation

The Sierra Club and OVC believe that the LORP goal of a healthy, functioning Lower Owens River Riverine-Riparian ecosystem through the recruitment and survival of riparian vegetation is best achieved if the seasonal habitat flows are designed and monitored as an adaptive management experiment. The experiment should include testing and monitoring different rates of incline and decline (ramping rates) using stage changes as a key metric to increase the opportunity for recruitment and survival of vegetation and to use water effectively. Not enough is known yet about the proper riparian recruitment and survival hydrograph in the Lower Owens River, particularly with the variable stage heights that the tule encroachment is causing.
Response: Need to first provide as much tule reduction and control as possible with higher flows during the growing season. Without adequate tule control first, we cannot empirically evaluate ramping rates or stop discharge.

Even though the LORP is still in its early stages and it is not possible to discern any long term trends, we are concerned that the recruitment and survival of riparian vegetation in the lower reaches of the LORP may be inhibited unless adequate stage height increases and landform inundation is provided and ramping rates are properly designed.

The Rapid Assessment Survey shows cottonwood and willow survival reduced in two reaches compared to other areas. These reaches are Manzanar Reward Road to Reinhackle Measuring

Station and Reinhackle Measuring Station to Islands Lease Grazing Exclosure. In the former reach half the sites had lower survival in 2009 than seedlings present in 2008. In the latter reach most of the cottonwood and willow seedlings observed in 2008 were not found in 2009. Of fourteen sites visited, eight had no survival. (Draft Plan, p. 122)

RAS Figure 9 shows that woody recruitment observations were over 2000 in 2008, compared to approximately 70 in 2009. There were 50 woody recruitments in 2007. RAS Figure 10 shows woody abundance by categories (1-5 seedlings, 6-25, 26-100, over 100). RAS Figure 10 also demonstrates that woody recruitment (in all categories) is far less than in 2008. In category 26-100 woody recruitment is only slightly above 2007 levels (when base flows were initiated). (pp. 117-118) Response to highlighted statement: *This statement is not correct – the woody recruitment observation were over 200 (not 200) in 2008.*

RAS Figure 11 shows woody recruitment abundance by reach (2009). This figure shows that relative to the upriver reaches, recruitment in the Islands area is low. (p. 118) RAS Figure 12 shows that woody recruitment in the Islands reach was proportionately higher relative to other reaches in 2008 than in 2009 (compare with RAS Figure 11).

Seasonal Habitat Flow Table 15 (p. 41) clearly shows that the aggraded wet floodplain (reach 4) and graded wet floodplain (reach 6) have had only a very small portion of the woody recruitment in both 2008 and 2009. *Response: Until the river experiences a 200 cfs flow during the peak riparian seeding period it is premature to draw too many conclusions regarding woody riparian recruitment.*

II. Recommendations for Adaptive Management of Seasonal Habitat Flows

We are concerned about the data regarding riparian vegetation recruitment, particularly in the lower river reaches, and believe it has implications for adaptive management of the habitat flows. The Draft Report contains the MOU Consultant's adaptive management recommendations for 2010 (Chapter 9). Ecosystem Sciences, the MOU Consultant, states that although they provide a discussion of some possible alterations of the seasonal habitat flow, they are not making a recommendation in this document and the proper time for their recommendation is after they have received the runoff predictions for the year (which is based on the April 1 forcast).

However, in their discussion on seasonal habitat flows the Consultants state:

> "A 2010 seasonal habitat flow of 200 cfs released during the right time in spring would also be of great benefit to accelerate the development of woody riparian habitat. Riparian habitat development is a key to LORP success." (p. 481)
>
> "As of yet, the project has not experienced a 200 cfs flow at the right time of year. Scientists have not been able to see or evaluate a normal year seasonal flow during the spring and concurring with maximum riparian seed drop. Additionally, extensive tule growth in the river channel since project inception has modified channel capacity and water flows. It is unknown what difference extensive tule growth will have on future 200 cfs flows. In the event the pattern of low water

> years continues, consideration should be given to alternative ways to achieve a 200 cfs peak flow. Project scientists could examine the volume of water allocated to each seasonal habitat flow based on the water year and reallocate that water over a compressed time frame that ensures a 200 cfs peak is released from the Intake. As described above, the Low Terrace landform is an abundant and important landform type within the LORP. Increasing flows to 200 cfs, even over a short duration, would increase the flooded area considerably by accessing the Low Terrace landforms. Doing so could "jumpstart" riparian vegetation on a landform that is dominated by more xeric vegetation types."

Any adaptive management recommendation for a 200 cfs seasonal flow in a low water year may be deemed by the Standing Committee to require MOU modification.[1] Although right now the Sierra snowpack is below normal, a lot can happen between now and April 1. 2010 could continue to be below normal or, as some forcasters predict, we may soon get some major storms that put us well above normal. In any event, we concur with the Consultant's suggestions that some alternative be explored and that having a full 200 cfs peak habitat flow in 2010 would be of great benefit to accelerate woody riparian habitat development. If 2010 is a dry year could we consider a higher flow than contemplated in the MOU? If there is a normal runoff year could there be a longer ramp down period of the high flows than is set forth in the LORP Plan? If the MOU Parties agreed to a one-time change to the pumping restrictions at the LORP pump station, it is possible that LADWP could recover much or all of the extra water included in a higher than typical seasonal flow or a longer than typical ramp down.[2]

OVC and Sierra Club also recommend that some inquiry should be made as to whether the same objective of a 200 cfs peak flow in 2010, released at the intake, can be achieved with a release from the intake of a lesser flow, as determined by the character of the runoff forcast (see MOU §II C1(b)ii), with augmentation from the spillgates. We would be especially concerned about spillgate releases to enhance flows to promote inundation of graded floodplains and low terraces below the Islands. It is to be noted that the Consultant also makes no suggestions concerning the duration or ramping pattern of the 2010 seasonal habitat flows.

Professor Patten has been requested by Sierra Club and OVC to offer his views, which he has done. He stated:

> Hydrology
>
> The timing of release of the Seasonal Habitat Flow in winter 2008 was not meant to be synchronized with riparian woody plant seed dispersal, but rather was meant as a channel maintenance flow. The 2009 flow was timed to be better synchronized with seed dispersal (late May).
>
> Duration and down ramp of the 2009 Seasonal Habitat Flow appears to be limited

[1] The MOU provides "In years when run-off is forecasted to be less than average, the habitat flows will be reduced from 200 cfs to as low as 40 cfs in general proportion to the forecasted runoff in the watershed."

[2] The pump station is restricted to a maximum pumping rate of 50 cfs. However, because of design redundancy, if the backup pump is operating the maximum capacity of the pump station is approximately 72 cfs.

relative to enhancement of woody riparian plant recruitment. Two days of peak flows (100 cfs), and just a few days of down ramp back to levels below 60 cfs may not have allowed sufficient time for recruited seedlings to grow roots to keep up with declining shallow alluvial water tables (e.g., a decline of 2.5 cm/day for cottonwood and 1.5 cm/day for willows). *Response: Good point and will be part of evaluating alternative seasonal habitat flows.*

Woody Plant Recruitment

This report compares data on abundance of recruitment of riparian woody plant species along the lower Owens between 2008 and 2009 (some 2007 data also). Woody plant recruitment was considerably higher in 2008 than in 2009. Several factors could control this difference. First, the 2008 flow of 200 cfs may have had lag-effects that allowed more seedlings to germinate in early spring (assuming that was when seeds began to disperse) compared to the relatively short-lived flow of 100 cfs in 2009 which had a relatively steep down-ramp. Second, there are no data on amount of seed dispersal comparing the two years. 2008 might have been prolific compared to 2009. Third, following the 2008 flows more vegetation grew on the floodplains which then became competitors to riparian woody plant seedlings trying to germinate and grow.

In comparing the years, one could compare different locations but this assumes that similar conditions occur from year to year at each location. It is probably preferable to compare trends in recruitment along the whole river and then look for locations that appear to have successful recruitment versus locations that don't. Future comparisons of conditions at "good" recruitment sites versus "bad" may offer some explanations on recruitment successes and failures along the river. In addition, one must remember that recruitment abundance relates strictly to seedling data and not sapling or surviving plants from year to year, thus a site could have little seedling recruitment one year, but still have a stand of surviving plants from prior years (revisited locations show some survival from earlier years). Research of riparian woody species recruitment shows that successful recruitment and survival occurs only occasionally, for example, once in 7-10 years. This is the reason that regular monitoring (Rapid Assessment if preferred) is necessary for the first 5-10 years of the LORP.

Since the beginning of releases into the lower Owens River in 2007, water table levels have continued to rise with some seasonal fluctuations (Hydrologic Monitoring Figure 6). Most water tables are still below 7 ft depth (a few at about 3-4 ft). This is too deep to support woody plant seedlings and young saplings but will be sufficient to support more mature woody riparian species (i.e., cottonwood and willow) but also including non-natives such as tamarisk and Russian Olive. One assumes that with continued releases, both base flows and seasonal habitat flows, the water table may continue to rise and be available to younger riparian woody plants in the future.

In summary, one should not compare data from two years with quite different controlled and ambient conditions and make long-term interpretations. On the other hand, if hydrology is one, if not the primary, driver in riparian woody plant recruitment, then, from an experimental basis, manipulating the hydrology from year to year to create what science shows to be the "best conditions" should be considered. *Agreed, long-term interpretations cannot be made with the available data. Also, it must be understood that recruitment is not just a consequences of flows, but grazing as well.*

Adaptive Management Recommendations

One of the suggestions of the Consultants in the annual report is to release a Seasonal Habitat Flow of 200 cfs from the intake in 2010 regardless of forecasted run-off. If this is accepted as an adaptive management activity, the duration of the flow should be long enough to get at least 140 cfs after one to two weeks at the pumpback station. The flow hydrograph should also be designed to allow an appropriate duration and magnitude of the down-ramp to allow root growth of germinating seedlings to keep up with the declining shallow water table. There is some thought by OVC and Sierra Club that rather than a release of 200 cfs at the intake, augmentation could take place along the river at the side gates. Although this may allow higher flows at some locations along the river, it will not necessarily create the appropriate hydrograph for successful riparian woody vegetation recruitment. Release of 200 cfs at the intake for a sufficient number of days comes closer to mimicking natural spring flows down the river. The issue here is determining the number of days needed to both wet floodplains, recruit seedlings and create appropriate conditions for recovery through the whole reach of the lower Owens.

However, if one is limited to amount of water used in a habitat flow, then augmenting flows from side gates might be the only way to get sufficient "levels" of water to lower reaches such as below the Islands. If we assume that the 200 cfs flows will occur only on average or above years, then we may have to wait for such a year to have sufficient water for good recruitment. That is not an unusual situation under natural scenarios. On the other hand, if all sides really buy into adaptive management, then one should be willing to think "outside the box" and determine changes that might enhance the riverine system. *Response: Good point and will be part of evaluating alternative flow analysis.*

III. Floodplan Inundation and Groundwater Discharge

The MOU Consultant concludes that White Horse Associates 2002 data, “overestimates flood-plain inundation as all wetted channels are mapped as flood plain.” Sierra Club and OVC agree with the Consultant’s recommendation that “re-mapping the landforms of the Lower Owens River and including a channel landform would significantly aid in accurately monitoring seasonal habitat flow events.” (p. 483)

The Consultant concludes: "At present the landform classification may be indicating artificially high inundation at base and high flows." (p. 484)

The Consultant further concludes:

> "Increasing the flows to 100 cfs inundates 73 percent of floodplain landforms, an increase of 13 percent, while a 200 cfs flow increases inundation of floodplain landforms to 88 percent (an increase of 28 percent over baseflow). The total acreage of floodplain landform inundation increases by about 397 acres. Inundation of the Low Terrace landform also increases in flooded extent from 10 percent at baseflow to 25 percent at 200 cfs. The increase in flooded acreage from 250 acres at baseflow to over 576 acres at 200 cfs, is 326." (p. 484)

The Consultant's conclusion supports their suggestion that a 200 cfs peak flow would be especially appropriate this year (p. 481). The 2008 habitat flow was in winter, and required principally for water quality purposes. The 2009 habitat flow was only 105 cfs, released from the intake structure and was unaugmented.

The Consultant identifies another (critical) issue that needs to be evaluated:

> "Another issue that we have identified that needs to be evaluated is the actual inundation of the Aggraded Wet Floodplain Reach (Reach 4). We believe the inundated acreage from the 2009 seasonal habitat flow is overestimated and our reticence to accept the inundated acreage is based primarily on the subjective nature of the analysis of Reach 4. This subjectivity needs to be removed to ensure that the effects of future seasonal habitat flows are documented correctly. For 2009 the most problematic issue is the use of 85 percent multiplier in the Aggraded Wet Floodplain reach type (Reach 4). Based on a small flow increase (Reinhackle Flow Station 50 cfs base to 86 cfs high flow) of only 36 cfs, the extrapolation multiplier could be no more than 67 percent, and possibly less. Using an extrapolation multiplier of 67 percent reduces the floodplain flooded area in the aggraded wet floodplain reach type by roughly 73 acres (344.1 – 271.). This type of error compounds error within the entire report resulting in an overestimation of actual inundation. Continuing this trend could result in exponential error over time. Thus, we feel that incorporating a field verification of base and high flow inundation within Reach 4 is a necessary component of future seasonal habitat flow monitoring. Monitoring and reporting of inundation in Reach 4 could also benefit from re-mapping the landforms as mentioned above." (p. 485)

Professor Patten recommends that the stage/discharge relationship for locations with varying levels of recruitment and survival be developed, monitored and reported. We agree and urge you to include this in the 2010 work program, and monitoring and analysis of the 2010 seasonal habitat flows. If the stage/discharge relationship is known, the down-ramp needed to develop an appropriate decline of the alluvial water table for cottonwoods and willows (e.g., 2.5cm/day and

1.5 cm/day respectively) could be estimated. If there is a stair-step decline that only lasts a few days, however, the substrate conditions and potential capillary rise maintained in the riverside sediments may be the only hope for good recruitment. The 2009 habitat release went from 50 cfs to 105 in two days and back to 50 cfs in three days. A 7-day stair-step decline for a 200 cfs release may or may not be adequate depending on the stage/discharge relationships and groundwater conditions at sites good for woody plant recruitment, although we know that 7 days is much shorter than the natural decline of the snowmelt river and streams in the Eastern Sierra. The seasonal habitat flow should be designed as an experiment to determine the optimal rate of incline and decline (the decline is much longer than the incline in a snowmelt stream) using stage changes as a key metric. Not enough is known yet about the proper riparian recruitment and survival hydrograph in the Lower Owens River, particularly with the variable stage heights that the tule encroachment is causing.

The lower reaches below the Islands are a critical Riverine-Riparian area, where woody recruitment is proceeding slowly relative to other areas (see above). We believe that the river reaches in the Islands and below the Islands appear to have the better geomorphic surfaces and seed sources for maximizing long-term willow-cottonwood recruitment and survival compared to the upstream incised reaches. The lower reaches have had proportionally the least recruitment, especially this past year which experienced seasonal flows that were attenuated down to 68 cfs, while the upstream incised reaches have had the most recruitment (nearly all willow). However, the incised reaches are in danger of getting inundated by increasing stage caused by the tule encroachment.

In light of the Consultant's observations, above, it is difficult to understand why appropriately timed augmentation from the spillgates, given limitations on peak flow from the intake, would not be appropriate for the downstream reaches below the Islands. Sierra Club and OVC recommend augmentation up to 200 cfs from the spillgate above this stretch.[3] As previously stated by Dr. Patten, above, to the extent the MOU contemplates adaptive management, "then one should be willing to think 'outside the box' and determine changes that might enhance the riverine system."

As noted previously, the Consultant suggested:

> "In the event the pattern of low water years continues consideration should be given to alternative ways to achieve a 200 cfs peak flow. Project scientists could examine the volume of water allocated to each seasonal habitat flow based on the water year and reallocate that water over a compressed time frame that ensures a 200 cfs peak is released from the intake. As described above, the Low Terrace land form is an abundant and important landform type within the LORP. Increasing flows to 200 cfs, even over a short duration, would increase the flooded area considerably by accessing the Low Terrace landforms. Doing so could "jumpstart" riparian vegetation on a landform that is dominated by more xeric vegetation types." (p. 485)

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[3] We mean that augmentation from the spillgate should raise the river flow up to 200 cfs below the spillgate in a normal or above year.

One alternative way to achieve a 200 cfs peak flow to access low terrace land forms would be through augmentation to the spillgates. The Consultant's recommendation that "project scientists could examine the volume of water allocated to each seasonal habitat flow based on the water year" is puzzling, in that the MOU prescribes only the maximum amount released from the headgates during normal, below-average, and drought water years at any one time (expressed in cfs) and does not address the duration or ramping pattern of the habitat flows. Sierra Club and OVC would not necessarily oppose a reallocation of water "over a compressed time frame that ensures a 200 cfs peak is released from the intake" as suggested by the Consultants, but we are concerned that a compressed time frame may make the flows ineffective in recruiting new woody riparian plants. We suspect that a longer declining limb of the seasonal habitat flow hydrograph, than originally proposed by the Consultants, would be more effective. We urge you to develop the stage/discharge relationships so the down-ramp needed to develop an appropriate decline of the alluvial water table for cottonwoods and willows could be estimated.

However, Sierra Club and OVC have previously expressed disagreement with the MOU Consultant's view that a certain quantum of water is "allocated" to the annual seasonal habitat flow by LADWP, either under the MOU or the 2004 FEIR. The MOU may prescribe a ceiling on the "amount" of seasonal habitat flows from the headgates. It does not prescribe the duration of peak flow releases, or the ramping pattern of such releases.

To the extent that MOU constraints could prevent 200 cfs flow releases from the head-gates in below normal water years, then augmentation might be the only way to get sufficient "levels" of water to lower reaches such as the Islands and below. *Repsonse: Ramping rates as suggested by Patton can be evaluated with the recommended stream flow modeling be cause we will have very accurate land form elevations, channel geometry, and stage discharge data.*

IV. Detailed Comments

Overall Comments and Recommendations

1. Annual report presentation – information presentation could be better focused on what was learned and what are the biggest management challenges to achieving the project goals. Describe how project goals are advanced through flow management and monitoring. The adaptive management recommendations by the MOU Consultant address the project goals and identify some of the management challenges, but are intentionally separated from the rest of the report to distinguish them from the observations presented in the various chapters. For example, control of tules and catttails is identified as one of the objectives of the seasonal habitat flows (Sec. 2.1, p. 3) and is discussed in the adaptive management recommendations (Chapter 9). But, the Chapter 2 Seasonal Habitat Flow Report does not address the tule management issue. Does that mean that the Chapter 2 authors do not consider tule control an issue worth discussing? *Response: Chapter 2 is a report on the Seasonal Habitat Flow, tule control was not observed during that period.*

2. Recommend summarizing 2009 flow management and observed flow at the 4 permanent stations and note that the summer flows at Intake and Mazourka Canyon were nearly as high

and of longer duration than the seasonal habitat flows. What influence could these higher flows have had on woody plant recruitment? *Response: Comment noted.*

3. Put river miles on all maps so one can compare locations across maps (part of recommendations to make report easier to understand and clearer interpretation of data). *Response: OK.*
4. Glossary is noted in the table of contents but there is nothing in the report. Glossary is very important so that there is a common understanding of technical terms. In particular define the floodplain landform terms such as wet and dry incised, graded and aggraded floodplain since not everyone has WHA 2004 readily available. *Response: The glossary is included in the final report*

Chapter 2: Seasonal Habitat Flow Report

5. Graphs of seasonal flows (Figure 2) are useful but X-axis is misleading in that it appears to be distance-incremented even though it is incremented by station. *Response:* These graphs are for illustrative purposes, the X axis in not to scale.

6. Sec. 2.6.1: According to DWP data sent to Peter Vorster, augmentation right before release of habitat flows was 15 cfs descending from 28 cfs, not the 12 cfs stated in text. *Response: 15 cfs was the correct value.*

7. Recommend that Sec. 2.4 or 2.6 briefly describe the different flow measurements that are obtained and reported (raw Son-tek, adjusted Son-tek, current meter, real-time, daily averages, monthly report QA/QC'ed daily averages). Some of this is described but all the tables and graphs should clearly note what data is being reported. For example, are the flows given in graphs and peak flows in Table 3 (p.16) based upon adjusted Son-tek values? *Response: Data come from the Son-Tek meters and are then adjusted.*

8. Sec. 2.8.4 incorrectly refers to cover type descriptions provided in Appendix 3C. It is in Appendix 3D, but that should probably be 2D. *Response: Change made.*

9. Recommend presenting overall summary of how wetted acreage measurements are made. *Response: Comment noted.*

10. Recommend correlating inundation increases with stage height and flow increases. For example, stage height increase was much greater in the upper reaches where flows were higher and tule encroachment increased stage, compared to the downstream reaches below the Islands where flow attenuation limited stage height increases. *Response: Comment noted.*

11. First sentence Sec. 10.1, p. 26: references should be to Chapter 2 not Chapter 3 sections. *Response: Change made.*
12. How much of the inundated areas are off-channel ponds, secondary channels, or high groundwater depressions versus areas near the existing main channel (see maps of inundated areas especially Plots 1 and 5). *Response: This information will be included in the 2010 LORP Annual Report.*

13. Page 41: Are the areas of greater woody riparian recruitment in the areas (dry and wet incised floodplain) where tule encroachment may cause inundation in the future and thus inhibit survival? *Response: Not that we are aware of?*

14. Page 41: The statement that the aggraded wet floodplain and graded wet floodplain have a large proportion of riparian vegetation and that future recruitment is limited implies that those areas have reached their riparian vegetation potential. This seems odd given that it appears to us that at least some large portions of these areas have the best potential for development of a good riparian woodland or forest. It's suggested that these areas "will not likely be able to recruit more early successional woody species without disturbance causing bare ground, regardless of the seasonal habitat flow." What do the MOU Consultants think of that suggestion?

15. Under vegetation cover type descriptions, Appendix 3D, there did not appear to be cottonwood associations or cottonwoods identified in any of the vegetation types. Is this correct, there are no areas with significant cottonwood cover? *Response: Correct.*

Chapter 3: Assessment of River Flow Gains and Losses

16. River Flows Table 1: ac-ft column should be labeled "ac-ft per day" to avoid confusion with total ac-ft for the month. *Response: Done*

17. The chapter should further elaborate on the importance of assessing gains and losses for helping to manage river flows and how such assessments were used in 2009. Could use the example of the June and July 2009 flow management as an example in which intake releases were initially very high based upon the 2008 gain and loss experience. Those releases appeared to be higher than needed to meet the flow requirement. Because the gains and losses are changing, we would recommend that gains and losses continued to be evaluated and reported for the next several years and not dropping that analysis as recommended by the MOU Consultant in Chapter 9. The gains and losses analysis should differentiate where possible the losses due to groundwater recharge versus losses due to ET. *Response: Future discussions of gains and losses will be incorporated into the Hydrologic Monitoring Chapter.*

Chapter 4: Rapid Assessment Survey Report

18. The river reaches used on the figures in Sec. 4.8 do not correspond to the reaches shown on Seasonal Habitat Flow Figure 5, River Reaches and Site Scale Monitoring Plots (p. 25). It would be very useful to show a map of the reaches as defined in the RAS and how that compares to the reach types shown on Seasonal Habitat Flow Figure 5. *Response :Agreed; this inconsistency was discussed by staff "after the fact"; The river reaches present in Sec 4.8 may be retained during implementation, however, future data summaries will be presented using reach categories consistent with the remainder of the document.*

19. Page 110, Russian Olive: The reports states: "The nonnative plant species Russian olive continued to persist in the LORP area with some evidence of recruitment and resprouting.

There were 134 Russian olive observations in the project area, slightly more than the observations in 2008 (115) and 2007 (75). As in previous years, Russian olive was detected throughout the riverine area south to U.S. Highway 136, the BWMA, and Lakes and Ponds (Maps 5-7 – Appendix 1)."
We don't understand how the increase in Russian olive observations from 2007 to 2008 to 2009 can be characterized as slight. We are very concerned that the number of observations in 2009 was an increase of 79% over the 2007 observations and 17% over those in 2008 even in a relatively dry year. With Russian olive occurring throughout a large portion of the riverine area, we recommend that a concerted effort be made to eliminate this nonnative species before it becomes a greater problem and control will become more difficult and more costly. *Response: We understand and agree with the concern. The differences in data collections methods in 2007/08 vs 2009, may be influencing the results; we think it is prudent to wait until next year to feel confident in evaluating trend. This data will be evaluated more rigorously in next years report.*

20. Page 112, Tamarisk: The report states: "There were 787 observations in 2009, slightly more than the 700 locations reported in 2008 RAS, and greater than the 600 locations reported in the 2007 RAS." Again, we don't understand how a 12% increase in resprout and untreated tamarisk observations from 2008 to 2009 can be characterized as slight. It would seem to indicate that the tamarisk control program is not keeping up with the problem. In Chapter 7 (Weed Control Report), section 7.5 (Inyo County Water Department Salt Cedar Treatment Program), it is acknowledged that the RAS data show an increasing tamarisk population, but there is no clear indication that the County's program will be able to keep up. In fact it refers to "limited personnel in the off season (April-September) to treat the resprouts." (p. 420) We recommend that Inyo County and DWP assess the ability of the program to meet project goals and, if necessary, increase the level of effort to keep up with the problem. *Response: See response to comment 19.*

21. Are the areas of greater woody riparian recruitment in the areas (dry and wet incised floodplain) where tule encroachment may cause inundation in the future and thus inhibit survival? *Response: Comment noted.*

22. Are the groundwater levels high enough in the secondary channel areas to sustain woody riparian recruitment and survival? *Response: Comment noted.*

23. Table of Contents does not have listing for Appendix 3 (photos). *Response: This will be fixed in the final report.*

Chapter 5: Hydrologic monitoring

24. We recommend summarizing flows at the 4 stations and the base flow management in the summer of 2009 after the seasonal habitat flows and note that the summer flows at Intake and Mazourka Canyon were nearly as high as the seasonal habitat flows. What influence could these high base flows have on vegetation recruitment and survival? Would the 2009 high base flows be considered an unusual event? *Response: The 2009 flows were approximately the same as 2008 when taking into account the augmentation flows. In general, DWP chose to try and provide the LORP inflows from the Intake rather than using augmentation in order to meet the court ordered flows for the LORP. Future operations are likely to mirror the 2009 operations unless environmental concerns or recommendations dictate otherwise.*

25. Page 181, Blackrock Waterfowl Management Area (BWMA) flow management: We recommend a more detailed summary of the flow management in the BWMA. Draw upon the existing narratives in the monthly reports. Assess what was learned from this year and any changes that might be made in future years. *Response: Comment noted. The annual report is a summary of an entire year instead of just a month and so was not as detailed as the monthly reports. An attempt will be made to discuss any important flow management issues in future annual reports.*

26. We recommend presenting the daily stage changes at the gaging stations during the seasonal habitat flow and any other daily water level data (such as data from the shallow wells) to see how water levels changed in response to flow. This will be helpful in further refining riparian recruitment flows. Stage data over time will also be helpful in understanding the relationship between stage and tule growth and extent. *Response: Comment noted. Stage data is available in all monthly reports and the test hole graphs will likely be shown in future LORP Annual Reports as they were in this annual report.*

Chapter 9: Adaptive Management Recommendations

27. Sec. 9.2, p. 481, first paragraph: It is stated that the MOU Parties are first consulted "following the completion of the draft Rapid Assessment Report." However, that "consultation" consisted of a 4-page memo from the MOU Consultants (dated 9/24/2009) which presented "the most salient observations from this year's survey." The draft Rapid Assessment Report was not made available to the Parties. In order to improve on the ability of the Parties to comment on the draft LORP Annual Monitoring Report, given the tight time schedule for our review in December and January, we request that in future years the first consultation include a copy of the draft Rapid Assessment Report, which is supposed to be completed at the time of the consultation. *Response: ESI was provided a bulleted summary of observations made during the RAS. The draft report was included in the LORP Annual Report.*

28. Page 485, Seasonal Habitat Flow, Recommendations: The Consultants point out that the 2009 high flows did not capture the timing of cottonwood and willow seed drop and dispersal and they recommend that timing the release of seasonal habitat flow "should be decided by the Scientific Team as described in the LORP Monitoring, Adaptive Management and Reporting Plan." It is unclear to us what is being recommended as there is, as we have pointed out several times in the past few years, no protocol in the LORP Monitoring, Adaptive Management and Reporting Plan for determining the timing of the flows. As reported at a Tech Group meeting this summer, the LADWP staff made the decision on the 2009 timing. Is the recommendation here simply to involve the whole Scientific Team, which consists of LADWP, Inyo County and Ecosystem Sciences? We strongly recommend that there be a protocol established that would set forth the factors considered and the process for determining the timing of the high flows. *Response: Comment noted.*

29. Page 486, Seasonal Habitat Flow, Recommendations: We agree with the need for re-mapping channel landforms. We recommend that technical representatives of the MOU parties (the LORP Advisory Committee[4]) be given an opportunity to be briefed and provide feedback on the mapping protocol and criteria. *Response: Comment noted.*

30. We recommend gathering and reporting surface and groundwater stage during the seasonal habitat flows. All water level stage measurement should be reported on a common datum so measurements can be integrated and evaluated. *Response: Comment noted.*

31. Page 486, Flow Gains and Losses: We recommend continuing gains and losses assessment. It should not be very time consuming. The monitoring program is still in its early stages and the gains and losses are still evolving. Given that river management depends on understanding the gains and losses, why not report it? Response: *Gains and Losses will be reported in the Hydrologic Monitoring Chapter in the future.*

32. Riparian recruitment survival – We recommend addressing the issue of relative lack of recruitment (see p. 41) in areas below the Island Reach where the graded floodplain and low terraces seems to offer the best potential for recruitment if the flows are high enough. *Response: Comment noted.*

33. Has there been any evaluation of the historic (pre-Aqueduct or pre-European settlement) vegetation distribution along the Lower Owens including the location of woody riparian reaches? It would be instructive to compare current areas of riparian recruitment and survival with historic locations to determine if new areas are being colonized. *Response: If you have any information regarding historic vegetation distributions along the river we would like to see it.*

34. On page 483 it is noted that "River flow, channel velocity, and channel geometry models combined with terrain and flow modeling technology will allow three-dimensional analysis and modeling of river depths in relation to channel landforms in several river reaches." It is not clear if field observations of these relationships – especially the relationship of river flow, stage, and the channel and floodplain landforms- were made in 2009 or are proposed to be made in 2010. *Response: Proposed for 2011.*

[4] As described in the final 2008 LORP Monitoring, Adaptive Management and Reporting Plan, Sec. 3.3.

35. Sec. 9.4.1, p. 487: BWMA Water and Acreage Management: Should note the challenges and delay that occurred in wetting up the Drew and Waggoner units (took much longer than expected and required flooding Winerton for a time in the summer) and what can be learned from that for future water management when new units are brought on; discussion should also include assessment of the current varying seasonal inflow regimes. The monthly reports provide helpful descriptions that could be incorporated into the annual report. *Response: Comment noted.*

36. Finally, as 2010 is an extensive monitoring year, we urge you to ensure that there is enough effort allocated in the 2010 workplan to fully and completely analyze the data collected and assess their implications for adaptive management. *Response: Comment noted.*

Respectfully submitted,

Mark Bagley, on behalf of Sierra Club and OVC
P.O. Box 1431, Bishop, CA 93515

cc: Clarence Martin and Brian Tillemans, LADWP
Larry Freilich, ICWD
Bill Platts, Ecosystem Sciences
Brad Henderson and Debra Hawk, CDFG
Carla Scheidlinger, John Williams, Greg Smith, Bob Meador, Ceal Klingler, and Don Mooney, OVC
Henning Jensen, Malcolm Clark, and Larry Silver, Sierra Club
Duncan Patten, Research Professor, Montana State University, Land Resources and Environmental Sciences Dept.

10.2. Spainhower Anchor Ranch, Inc. Comments

Spainhower Anchor Ranch, Inc.
Drawer P, Lone Pine, California 93545
(760) 876-5435 or (760) 876-4266

December 30, 2009

Mr. Gene Coufal, Manager
Aqueduct System
300 Mandich Street
Bishop, CA 93514

RE: Comments on LORP Utilization Lone Pine Lease 2009

Dear Mr. Coufal:

Thank you to the LADWP for changing to inches from meters as the method for measuring forage.

Utilization rates of 40% are overly restrictive for this section of the Owens River. This can be proven by the statement in the 2009 annual report: "Despite high utilization rates the riparian pasture was initially and continues to remain in high ecological condition…..Trend for all sites in 2009 was either static or upward." A 40% utilization rate is too low because we are talking about dormant forages, not green growing grasses on a high mountain meadow. As I understand it, the basis for the 40% utilization rates to protect shrubs is from a study done on a summer grazing allotment, and not in a dormant grass grazing situation, as is the case on the Lone Pine lease.

For 2009, to not be over the 40%, you would have had to leave rye grass one foot high. That is dormant grass, not actively growing grass that needs to feed its root system. Also, all grasses are considered grazed if they break off for whatever reason (i.e. snow, wind, or animal action).

There has been a massive die-off of willow trees on the Lone Pine lease in the last 25 years. This was due to drowning by beaver dams. The Spainhower Anchor Ranch and citizens of Lone Pine told the LADWP that this was happening. I was told that the California Department of Fish and Game would not allow the LADWP to control the beavers. In later years beaver control finally took place, but it was too late- the trees were dead. These trees had been healthy with the cattle grazing that took place then. It wasn't the cattle that killed the trees. If the LORP objective is recruitment of new trees, then perhaps more importance should be placed on keeping trees healthy, and less emphasis on a 40% grazing limit.

In the future it would prove helpful if the LADWP would notify the Spainhower Anchor Ranch ten days in advance when maximum allowable utilization will take place.

Sincerely,

Tom Noland

Tom Noland, Manager

Mr. Tom Noland, Manager
Spainhower Anchor Ranch, Inc.
Drawer P
Lone Pine, CA 93545

Subject: Response to Comments on LORP Annual Monitoring Report 2009

Dear Mr. Noland:

Thank you for your comments regarding the 2009 LORP Annual Monitoring Report. Your contributions and participation in this process will help improve the management of the Lower Owens River Project (LORP). We will continue to report stubble heights in inches and are pleased to know that this adjustment has been helpful.

You state that the end of season utilization of 40% is overly restrictive for the Lone Pine Lease riparian pasture and support this by citing the high ecological condition of the riparian floodplains as described in the 2009 LORP Annual Monitoring Report.

The range trend data results from the LORP Annual Monitoring Report are encouraging, however implementation of the LORP project requires adherence to the 40% utilization standard for riparian zones. The LORP management area has been heavily modified during the past 100+ years from a variety of activities ranging from flow diversions, altered fire frequencies, to the introduction of beavers, Tule elk, and livestock grazing. Reference areas that represent conditions prior to these disturbances for comparison to current changes in management on the Lone Pine Lease and other leases in the LORP management area are not available. Because of this absence, in order to evaluate the effects from implementing changes in management, a baseline dataset needs to be established. The 40% standard was agreed upon by the MOU parties and lessees and is a stipulated court order. The baseline utilization rate for the LORP riparian zones according to the 2004 EIR and EIS for the Lower Owens River project is 40% in riparian pastures and 65% in upland pastures. The 40% utilization level for riparian pastures was incorporated into the EIR and EIS based on a large number of riparian studies primarily conducted during the spring, summer, and fall grazing season (Clary and Webster, 1989) as well as the successful implementation of riparian grazing standards implemented on other LADWP lands located in Long Valley. As detailed in the introduction of the 2009 LORP Annual Monitoring Report, range trend results on Torrifluvents-Fluvaquaentic Endoaquolls soils (floodplain sites) describe conditions adjacent to the stream bank but not the actual stream bank. The assumption is that at or below 40% use, livestock will not negatively impact woody species recruitment and regeneration on the stream bank. Your comment suggesting that ‘more importance should be placed on keeping trees healthy’ was noted and LADWP will begin developing a monitoring strategy to track riparian woody species recruitment and condition over time.

Target stubble heights are based upon non-linear relationships between perennial grass heights and their weights. Depending upon the species and the year, the 40% stubble height will vary. As stated in the LORP annual monitoring report, the 2010 grazing season stubble height of 11 in. would equate to 40% use of beardless wild rye. The operational definition for utilization that the LADWP uses is defined in the Utilization Studies and Residual Measurements Interagency Technical Reference:

“Utilization is the proportion of degree of current year’s forage production that is consumed or destroyed by animals (including insects). Utilization may refer either to a single plant species, a group of species, or the vegetation as a whole (BLM 1999).” This is accepted by both Federal land management agencies and the Society for Rangeland Management as the working term for utilization (Society for Range Management 1998).

Beaver activity is under surveillance by LADWP Watershed staff while working throughout the year on the Owens River and during the Rapid Assessment Surveys. When ‘problem’ beavers are located, they are removed and their dams are destroyed. Please notify the county or LADWP about any recent beaver activities.

The LADWP Watershed Staff will work more closely with you this grazing season (2010) to ensure that you will be able to meet the riparian utilization guidelines.

References

BLM. 1999. Utilization Studies and Residual Measurements. Interagency Technical Reference. U.S. Bureau of Land Management Technical Reference 1734-3
165 pp.

Clary, W. P. and B. F. Webster. 1989. Managing grazing areas in the Intermountain Region. General Technical Report INT-263. USDA Forest Service, Rocky Mountain Research Station, Ogden, UT.

Society for Range Management 1998. Glossary of terms used in range management. 4th edition. Society for Range Management, Denver, Colo. 32. p.

10.3. Inyo/Mono Agriclutural Commission Comments

To LADWP
RE: LORP and River Fluctuations

The water management decisions made by LADWP, can have huge consequences in terms of mosquito production throughout the Owens Valley. Here is some background on this phenomenon.

Many believe that mosquitoes need stagnant water to reproduce, which is true for many species, where gravid females seek out suitable water sources, within which, to lay their eggs.

There are species however, the floodwater mosquitoes, that lay eggs at the base of vegetation within a floodplain or in fresh mud from a receding water source. Once dried within the flood plain boundary, these eggs resist desiccation and can wait years for new water to rewet the parched soil. Over time, these egg banks become flush with literally millions of eggs just waiting for the next inundation to hatch and grow. If conditions are optimal the resulting hatches can be huge, remaining pestiferous for weeks after with the number of insects landing on you at any one time near the source, in the thousands.

Floodwater mosquitoes, aside from their pestiferous nature, do pose some disease transmission risk. Western Equine Encephalomyelitis, St. Louis Encephalitis, and California Encephalitis have all been isolated from *Aedes melanimon*, the most abundant local floodwater species. *Aedes melanimon* may also play a role in secondary transmission of the endemic West Nile Virus. We are constantly vigilant and always concerned about mosquito-borne disease. In fact, in 2003, the Inyo County Department of Environmental Health Services identified a positive pool of *Aedes melanimon* for California Encephalitis while conducting routine WNV surveillance.

Long ago, flood events of a magnitude large enough to affect mosquito production were weather related and seasonal in nature, corresponding with runoff of the sierra snowpack. These days, floodwater mosquitoes have adapted well to the monthly pasture irrigation cycles so common in the Owens Valley. Each round of pasture irrigation has become, in essence, a small scale spring runoff that, though relatively small in acreage, will produce millions of mosquitoes if pasture production is looked at cumulatively. Not only have they adapted very well to pasture irrigations, but also to artificial river fluctuations with the Owens River itself being the largest single source of floodwater mosquitoes in the Owens Valley.

As you know, when the Owens River volume is augmented out of the Pleasant Valley Reservoir to numbers above 400 CFS (cubic feet per second), the flow begins to move beyond the river bank and find its way into old, dry river channel. It is these ancient channels that hold the vast egg depositories.

Every one of the eggs in a source will not hatch on every flood event. Scores will, but the remainder, for reasons of species survival, will not hatch during this flood event. The eggs that became inundated, yet failed to hatch, will require another period of drying before they are conditioned and ready to hatch again.

This gives the OVMAP the break it needs to make safe, effective, biological larvaecide treatments so long as the water level doesn’t rise in the near term. If the water slowly rises, then eggs will gradually and continually hatch as the water creeps upward. This scenario is worst case as an initial treatment of larvaecide is only effective for a few days leaving larvae that hatched later, due to creeping water levels, able to grow unabated. Additionally, if water levels rise rapidly soon after a treatment, dilution of the active ingredient may render the entire treatment useless.

Once hatched, conditions for larval growth are based on day length, food availability, and average daily temperature, all of which are increasing as we move into summer. During midsummer, when growth factors are optimal, development from egg to adult can happen in as little as 5 days. This leaves precious little time to plan and apply an effective larvicidal treatment, especially over the many acres comprising the Owens River floodplain. As such, a sizable release of river water in June, July, and August can be devastating in terms of adult mosquito production.

After emergence, adult floodwater mosquitoes can migrate many miles in search of a blood meal utilizing humid riparian corridors to travel through. Strong winds will compound the situation, pushing mosquitoes along far faster than they can fly unaided, as well as, impeding our ability to apply adulticides effectively.

Considering the LORP and the Seasonal Habitat Flow, timing is critical to get the desired outcome of the establishment of woody riparian plant species. There is a very narrow window of opportunity to get concurring high river flows with maximal riparian seed drop. Presumably, some years the flow will begin earlier and some years later depending on conditions reported from the field. But as this vital window for success gets pushed further into optimal mosquito growing months, floodwater mosquito production can only increase.

As implied above, this floodwater mosquito cycle has been going on apparently since there was an Owens River, and is nothing new. These days, however, we have almost total control over both the Owens and the LORP. There will always be emergencies, but much of this unwanted mosquito production and subsequent pesticide application could be avoided with timely and considerate volume changes where feasible.

We covet good communication between our two agencies and welcome any opportunity to discuss management strategies in order to better serve the needs of the people living in and visiting the valley.

Sincerely,

Jerrold Oser
Manager, OVMAP

10.4. California Department of Fish and Game Comment

-----Original Message-----
From: Brad Henderson [mailto:BHenderson@dfg.ca.gov]
Sent: Monday, January 11, 2010 5:00 PM
To: Bob Harrington; Coufal, Gene
Cc: Debra Hawk
Subject: Draft LORP 2009 Annual Monitoring Report

Bob and Gene,

After extensive review by staff, DFG does not have any comments on the draft report. We expect that opportunities for fine-tuning monitoring and management measures will become more apparent in future years, and the results of next year's extensive monitoring will be very informative. In some cases we are adopting a "wait and see" approach as more is learned.

Thanks again for extending the review period.

Brad

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--Conserving California's Wildlife--

11.0 GLOSSARY

BLM – U.S. Department of Interior, Bureau of Land Management

BWMA – Blackrock Waterfowl Management Area

CDFG – California Department of Fish and Game

CEQA - California Environmental Quality Act

CEQA mitigation – Measures to reduce or avoid impacts identified through the environmental impact analyses performed for an EIR or Negative Declaration

cfs – cubic feet per second

County – Inyo County

CWHR - California Wildlife Habitat Relationship System

Delta conditions - The amount of water and vegetated wetland within the Delta Habitat Area boundary existing at the time of the commencement of flows to the Delta under the LORP

ES - Ecosystem Sciences

EIR – Environmental Impact Report

ET – Evaporation transpiration

LAA – Los Angeles Aqueduct

LADWP – Los Angeles Department of Water and Power

LORP – Lower Owens River Project

MOU – Memorandum of Understanding amongst LADWP, the County, California Department of Fish and Game, State Lands Commission, Sierra Club, the Owens Valley Committee, and Carla Scheidlinger. The MOU specifies goals for the LORP, a timeframe for the development and implementation of the project, specific project actions, and requires that a LORP ecosystem management plan be prepared to guide the implementation and management of the project. It also provides certain minimum requirements for the LORP related to flows, locations of facilities, habitat and species.

RAS – Rapid Assessment Survey

SIP – State Implementation Plan *June 2004 Los Angeles Dept of Water & Power and the U.S. Environmental Protection Agency* 17-3 *Lower Owens River Project Final EIR/EIS*

SLC – California State Lands Commission

WHA – Whitehorse Associates