2.0 PROJECT DESCRIPTION (PROPOSED ACTION)

2.1 INTRODUCTION

2.1.1 Purpose and Need

The LORP is mitigation for certain water gathering activities by LADWP from 1970-1990. The LORP will implement applicable provisions of the 1991 Inyo County/Los Angeles Long Term Water Agreement (Agreement), the 1991 EIR, and the MOU. In regards to the LORP, the MOU augments the Agreement and the 1991 EIR. The LORP must be implemented in compliance with the specific objectives, project elements, implementation schedule, agency responsibilities, and limitations contained in the MOU. Substantive changes to the LORP that are not in conformance with the MOU can only be implemented following the processes outlined in the MOU and Agreement, and may need Court approval. Furthermore, issues in the MOU that are subject to differing interpretations by the various MOU parties must be resolved either through the dispute resolution process identified in the MOU, or through Court action.

2.1.2 LORP Plan

The MOU requires LADWP and the County to direct and assist Ecosystem Sciences in the preparation and implementation of a "LORP Plan" following the procedures outlined in an Action Plan, which is incorporated into the MOU. The Action Plan requires that the LORP Plan describe the four physical features of the LORP: (1) Lower Owens River Riverine-Riparian Ecosystem; (2) Owens River Delta Habitat Area; (3) Off-River Lakes and Ponds; and (4) Blackrock Waterfowl Habitat Area. The LORP Plan is comprised of several plans. The Action Plan specifies the scope of the various plans that comprise the overall LORP Plan, including plans for river management, wildlife and wetlands management, habitat conservation, land management, and monitoring.

In May 1999, LADWP issued a draft LORP Plan, which was prepared by Ecosystem Sciences for review by the MOU parties. The May 1999 draft LORP Plan and comments received on the plan are available for review at the offices of LADWP and Inyo County Water Department in Bishop, California and at the offices of the EPA in San Francisco, California. In response to comments from the MOU parties, the draft LORP Plan was revised by Ecosystem Sciences in August 2002. The LORP Plan describes Ecosystem Sciences' recommendations for general goals, and specific objectives and actions to implement the various elements of the LORP. The recommendations described in the LORP Plan are intended to meet the goals and objectives specified in the MOU and to address the specific areas identified in the Action Plan.

The August 2002 LORP Plan is available for public review at the offices of LADWP and Inyo County in Bishop, California, and at the offices of EPA in San Francisco, California. The LORP Plan draws from various studies conducted by Ecosystem Sciences, which were incorporated into the LORP Plan. To the extent that there is an inconsistency or conflict between a provision of the LORP Plan and the contents of a technical memorandum, the provisions of the LORP Plan represent Ecosystem Sciences' current recommendations and, therefore, supercede the technical memoranda. The technical memoranda are listed below.

1. Hydrologic Plan for Implementing Initial Maximum and Minimum River Flows (no date)
1a. Addendum to Hydrologic Plan for Implementing Initial Maximum and Minimum River Flows
2. Initiation of Resource User Group/Recreation Plan (no date)

3. Distribution and Abundance of Beaver in the Lower Owens River (no date)
4. Mapping Existing Vegetation Types for the Blackrock Waterfowl Habitat Area (no date)
5. Outline of a Preliminary Plan for the Conservation of Threatened and Endangered Species (no date; out of date – no longer applicable)
6. Results of User Group Interviews (no date)
7. Water Quality in the Lower Owens River – Existing and Future Conditions (no date)
8. Owens River Delta Habitat Area (January 1999);
   - 8a. Addendum to Technical Memorandum 8 (February 14, 2000)
   - 8b. Addendum to Technical Memorandum 8 (April 10, 2000)
   - 8c. Tables for Addendum to TM-08c (June 2000)
9. Management of Tules and Organic Sediments (no date)
10. Framework for the Recreation Plan (no date)
11. Critical Path for Flow Management During the Initial Years (no date)
12. Springs and Seeps Inventory and Assessment (no date)
13. Groundwater- Surface Water Interaction (no date)
14. Fisheries in the Lower Owens River (no date); revised version issued April 2001
15. Resource Management in the Blackrock Waterfowl Habitat Area (November 1998)

15a. Macroinvertebrates: A protocol for sampling seeps and springs (no date)

16 Revised Projections of Wildlife Habitat Units for the Lower Owens River Using HSI Models (June 1998)

17. Alternative Rewatering Techniques (February 1999)
18. Wetland Management Plan: Blackrock Waterfowl Habitat Area Implementation (April 1999)
19. Riparian Wildlife Management – Summary of Management Concepts and Priorities (March 1999)
20. Special Status Wildlife and Plant Species Accounts (August 1999)

No number. Grazing Management Plans for Blackrock, Thibaut, Island and Delta, Twin Lakes, and Lone Pine leases (five plans, 1999)*.

* The individual grazing management plans were developed by Ecosystem Sciences and LADWP in cooperation with each leaseholder. Lessees agreed to provide the proprietary information to Ecosystem Sciences and LADWP with the understanding that the information would remain confidential. Therefore, the lease-specific grazing management plans are not available for public review (see also Section 2.8.1).

2.1.3 Relationship of the EIR/EIS Project Description to the LORP Plan

The LORP Plan has been developed by Ecosystem Sciences as mandated in the MOU. The LORP Plan is grounded in the concept of adaptive management (see Section 2.10), which assumes findings made over the course of time will direct future actions of the parties. The project description in this EIR/EIS has been developed from the August 2002 LORP Plan. The project description incorporates management actions contained in the LORP Plan, including the adaptive management concept, and provides the specificity required for environmental analysis of impacts and subsequent project approval and implementation. Actions to be completed as described in the most recent LORP Plan are analyzed in this EIR/EIS.

2.1.4 Approach to Ecosystem Restoration

If monitoring results indicate that the changes in environmental conditions are inconsistent with the LORP objectives, LADWP and the County will implement feasible adaptive management measures. The adaptive management approach is described below in Section 2.10.5. Under the proposed project, the effects of altered river flows, changed flooding patterns in wetland areas, and modified land management

practices will be monitored on an ongoing basis to determine if the desired goals are being achieved, and if not, the adaptive management actions will be considered and implemented as necessary and to the extent consistent with the MOU. This approach contrasts with alternative habitat restoration approaches that involve active planting of vegetation and/or introduction of wildlife species.

While the natural hydrology of the river was considered in developing the water regime for the Lower Owens River and the Delta Habitat Area, the proposed river flows will differ from flows which would result under natural, pre-Los Angeles Aqueduct conditions. In the Blackrock Waterfowl Habitat Area, ditches and levees will be modified to allow year-to-year and seasonal manipulation of water regimes to periodically flood different areas. Also, the Blackrock area of the LORP will be actively managed to meet habitat and waterfowl goals. Similarly, the modified land management practices on LADWP leases in the LORP area will be based on active modifications of grazing practices and pasture boundaries based upon ongoing monitoring.

2.1.5 Relationship of the LORP to Groundwater Pumping and Surface Water Management in the Owens Valley

The LORP does not include the construction of new groundwater wells in the Owens Valley to supply the LORP, nor does the LORP include an increase in groundwater pumping in the Owens Valley as part of the project (aside from new or replacement stockwater wells with no substantial increase in groundwater pumping over exiting conditions; see Section 2.8.1.2). Further, the LORP does not include any changes in surface water management practices in the Owens Valley except for those changes within the LORP area specifically described in the project description that are necessary for the implementation of the LORP. Groundwater pumping and changes in surface water management practices in the Owens Valley are governed by the 1991 Inyo County/Los Angeles Long Term Water Agreement. The Agreement establishes procedures for managing groundwater pumping to avoid/minimize impacts to groundwater-dependent vegetation, monitoring pumping and surface water management practices to identify vegetation impacts, and implementing mitigation measures, if necessary.

2.2 ADMINISTRATION OF THE PROJECT

2.2.1 Roles and Responsibilities of Involved Agencies

The LORP will be implemented through a joint effort by LADWP and the County. The other MOU signatories will not have any direct management responsibilities for the LORP. EPA will provide funding for the project, and will ensure that its federal responsibilities associated with the funding are met, but EPA will not be actively involved in the implementation of the project. Regulatory agencies including the CDFG, Lahontan Regional Water Quality Control Board, and Corps of Engineers, will influence the LORP through various permits and approvals.

The County and LADWP will conduct the monitoring associated with the LORP, provide analysis of technical data, and prepare an annual report that includes monitoring data, analysis and recommendations on the need for adaptive management actions. The annual report will be made available to the public. The construction of physical facilities and modification of land and water features associated with the LORP will be conducted by LADWP personnel and consultants/contractors working for LADWP.

The Inyo/Los Angeles Technical Group ("Technical Group") was formed in 1982, and is comprised of staff from LADWP and the County. It will meet to review the annual report prepared by LADWP and the County, and will meet as necessary to review other monitoring data and recommendations, to determine if management actions need to be modified within the framework of the adaptive management approach in

order to better achieve the LORP goals. Agendas of Technical Group meetings are provided to the public in advance of each meeting and the Technical Group meetings are open to the public.

Also, following the implementation of the LORP, in December of each year, the Technical Group will develop and adopt an annual work program describing the work to be performed in regard to the LORP (including the implementation of adaptive management measures) during the following fiscal year. Each work program will identify who will perform or oversee the work, a schedule for the performance of the work and a budget. Following adoption by the Technical Group, the work programs will be submitted to the County and LADWP governing boards for consideration of approval. Meetings of each governing board are open to the public. Before the work plans and accompanying budgets can be implemented, they will have to be approved by each governing board.

If the Technical Group is in disagreement over the need to implement an adaptive management measure or over the content of a work program, the disagreement will be submitted to the Inyo County/Los Angeles Standing Committee ("Standing Committee") for resolution. The Standing Committee was formed in 1982 and consists of both managers and elected and appointed officials from the County and LADWP. Its meetings are open to the public. If the Standing Committee is unable to resolve a disagreement, the disagreement will be submitted to the governing boards of each entity for resolution. If the governing boards are unable to agree on all, or any part, of a work program, the portion of the program in disagreement will not be implemented. Further, if the governing boards are in disagreement over the need to implement an adaptive management measure, the measure will not be implemented. The dispute resolution process, including mediation/facilitation and litigation, is detailed in the MOU (Sections VI and VII).

2.2.2 Costs and Funding Sources

2.2.2.1 Implementation Period Costs

Under the Agreement between the County and LADWP, the County must reimburse LADWP for the costs of implementing the LORP (up to a maximum of $3.75 million), less any funds for the project that are provided by sources other than LADWP (such as grants). LADWP will pay for implementation costs in excess of $3.75 million.

Major implementation costs include construction of the pump station and its associated power line and water control and measuring facilities; modification of the River Intake structure; fence installation; improvements to spillgates; road work; construction and improvement of berms and ditches in the Blackrock area; channel clearing; and installation of stream gages. Implementation also includes planning and development work for the LORP, including the technical consulting services of Ecosystem Sciences for preparing the LORP Plan, the services of URS Corporation for assistance in preparing the EIR/EIS, project permitting efforts by LADWP, the removal of the temporary stream gages, and the construction of a new ditch or pipeline near Goose Lake.

As shown in Table 2-1A, the total cost of implementing the project is estimated to be approximately $15.5 million. The estimates for the other project implementation costs identified in Table 2-1A were developed by LADWP between June and October 2001.

TABLE 2-1A
ESTIMATED LORP IMPLEMENTATION COSTS*

Project Component	Estimated Cost
Pump station**	$9,800,000
Pump station contingencies**	1,700,000
Pump station subtotal	11,500,000
Intake modification	721,000
Spillgate Improvements	96,000
Channel clearing	172,500
Temporary stream gages	191,000
Fencing	1,047,000
New culverts	31,000
Blackrock berms and ditches	139,000
Pump station power line	881,000
Environmental review	375,000
Sub-total (excluding pump station)	3,653,500
Contingencies (+10 percent)	365,350
TOTAL =	$15,518,850

*Does not include the following implementation costs: technical consulting services of Ecosystem Sciences, the removal of the temporary stream gages, installation of at least four permanent stream gages, project permitting, paving of the road from the Aqueduct to the pump station, and construction of a new ditch or pipeline near Goose Lake.
**Based on preliminary cost estimates developed by Bureau of Reclamation in May 2004.

2.2.2.2 Post-Implementation Period Costs

The Agreement provides that, once the LORP has been implemented, LADWP and the County will each be responsible for one-half of the annual operation costs of the LORP that are not related to the pump system, and that LADWP will pay all operation and maintenance costs of the pump system. These "post-implementation" costs are for activities related to operation and maintenance, monitoring and reporting, adaptive management, and mitigation measures. Both the County and LADWP intend to fully fund their share of the post-implementation costs of the LORP in accordance with the Agreement and the more recent provisions of the Stipulation and Order entered in Inyo County Superior Court Case Number S1CVCV01-29768 (*Sierra Club and Owens Valley Committee v City of Los Angeles et al*., February 13, 2004; see also Section 1.1). The stipulation calls for LADWP to provide matching funds to Inyo County for saltcedar control as detailed in Mitigation Measure V-3 (Section 10.4.4). Except for LADWP funding to be provided to the Inyo-Mono County Agricultural Commissioner as described in Mitigation Measure V-2 (Section 10.4.4; non-saltcedar noxious weed control), all mitigation measures identified in this EIR/EIS are considered post-implementation costs to be shared equally by LADWP and Inyo County.

After adoption of the LORP, the governing bodies of the County and LADWP will adopt a policy that sets forth each entity's responsibilities for the funding of the LORP during the implementation and post-implementation periods and which describes the procedures for managing the LORP during the post-implementation period. Although not finalized, a working draft copy of the post-implementation policy that will be considered by the governing bodies is provided in Appendix C. As required by law, decisions as to the availability of funding for the LORP will be made annually by the Inyo County Board of Supervisors and by the LADWP Board of Water and Power Commissioners. In the event that one or both governing boards determine that there are insufficient funds available to cover the entity's share of the costs of the LORP, each entity will evaluate the situation and will take such action as it deems appropriate under the then existing applicable law.

Intensive monitoring and implementation of adaptive management measures to better achieve the goals of the LORP are expected to only be necessary during the initial 15 years of the project (Ecosystem Sciences, 2002). After that time, it is anticipated that the goals of the project will largely have been achieved. Therefore, the estimates of the monitoring and operation and maintenance activities are based upon this 15-year period. Since the future needs for adaptive management and, to some extent, mitigation, are unknown, it is not possible to accurately estimate these components of the post-implementation costs.

It is estimated that the cost of operating and maintaining the project (including the maintenance of project flows, maintenance of certain ditches, levees, spillgates, flow measuring devices, beaver control, and certain grazing fences – but not including the operation and maintenance of the pump station) will be approximately $4.2 million during the 15-year period following the implementation of the LORP. LADWP developed estimates of the costs of project operation and maintenance by estimating the amount of time it would take LADWP staff to maintain the project's facilities and calculating LADWP's costs to fund that staff time; the estimates do not include the costs of materials. The 15-year operation and maintenance estimate includes a 3 percent annual inflation adjustment. It is currently anticipated that LADWP staff would perform the maintenance and operation activities and that the County would reimburse LADWP for one-half of LADWP's costs. Over the long term, County staff could perform some of this work.

The costs of implementing the monitoring program identified in Section 2.10 during this 15-year period are estimated to be approximately $2.6 million. To develop the estimates of the costs for project monitoring, LADWP, the County, and Ecosystem Sciences developed estimates of the staffing and time required to conduct each monitoring component identified in Section 2.10. Hourly and daily costs were assigned to each staff position (e.g., hydrologist, biologist, field technician) based on a range of hourly costs for similar positions charged by a sample of consulting firms. The annual cost of each monitoring component was estimated as the staff costs multiplied by the estimated time to perform a given monitoring component plus a daily vehicle charge. The estimated total cost for implementing the 15-year monitoring program includes a 3 percent annual inflation adjustment. It is currently anticipated that the monitoring responsibilities for the LORP would be shared equally by staff from the County's Water Department and LADWP.

Taken together, the costs of the LORP for operation, maintenance, monitoring and mitigation during the 15 years following the implementation of the LORP are estimated to be approximately $13.4 million (see Table 2-1B).

TABLE 2-1B
ESTIMATED LORP POST-IMPLEMENTATION COSTS*

Post-Implementation Item	Estimated Cost
Operation and Maintenance	$4,200,000
Monitoring	2,600,000
Mitigation	6,600,000
Total	**$13,400,000**

* Does not include the following post-implementation costs: adaptive management costs (which are unknown at this time) and maintenance, operation or other related costs associated with the pump station (which are funded by LADWP as provided in the Agreement).

2.2.2.3 Project Funding

LADWP has committed to provide funding for the LORP as described in Table 2-1C.

TABLE 2-1C
LADWP FUNDING COMMITTMENTS

Funding	Amount
LORP Implementation	Total implementation cost minus $3,750,000
Pump station operation and maintenance	All
Non-saltcedar noxious weed control for first 7 years (Mitigation Measure V-2, see Section 10.4.4)	$1,400,000
Matching funds for WCB grant for saltcedar control (Mitigation Measure V-3, see Section 10.4.4)	$560,000 (min) $1,500,000 (max)
All other post implementation costs	One-half

Table 2-2 shows the amount of funding currently available to support the County's share of the costs of the LORP. The County currently has approximately $2.8 million available to be applied toward post-implementation costs of the LORP. EPA is the primary outside funding source. Congress has appropriated, through EPA, a total of $6.3 million for the project ($5,393,033 to the County and $862,200 to LADWP). In addition to EPA funds, to date, the County has received $360,000 from the U.S. Bureau of Reclamation and $250,000 from the U.S. Department of Housing and Urban Development (HUD). The County has also obtained a grant in the amount of $560,000 from the Wildlife Conservation Board (WCB) for saltcedar control. These funds, when combined with funds that will come from the EPA, will provide a total of about $6.6 million to the County to cover its share of the costs of the LORP.

TABLE 2-2
LORP FUNDING CURRENTLY AVAILABLE TO SUPPORT THE COUNTY'S SHARE OF THE COSTS OF THE LORP

Funding	Amount
EPA grant to County	$5,393,033
HUD grant to County	250,000
Bureau of Reclamation grant to County	360,000
WCB Grant to County for Saltcedar Control	560,000
Total funding currently available to County (A) =	$6,563,033
Amount of funding currently available to County that will be applied to implementation costs (B) =	$3,750,000
Amount of funding currently available to County that will be applied to post-implementation costs (A – B) =	$2,813,033

In addition, both LADWP and Inyo County will actively seek additional funds from non-County/non-LADWP sources.

2.2.3 Schedule and Phasing

The MOU requires implementation of the LORP in the following timeframe:

> *"DWP will commence the baseflow of 40 cfs in the river channel by the 72nd month after the discharge of the writ unless circumstances beyond DWP's control prevent the completion of the pumpback system and/or the commencement of the baseflow within the 72-month period. DWP will commence implementation of the other physical features of the LORP upon the certification of the LORP EIR."*

The writ was discharged on June 13,1997; hence, the MOU required that the baseflows be established in the Lower Owens River by June 13, 2003. This deadline has not been met, and is replaced by the new schedule specified in the February 2004 Stipulation and Order (see Section 1.1.5). The February 2004 Stipulation and Order specifies that LADWP release the Final EIR/EIS by June 23, 2004, and present the Final EIR/EIS to the LADWP Board of Water and Power Commissioners for certification in August 2004. Initial releases of water (Phase 1 flows) to the lower Owens River are to begin no later than 6 months after all relevant permits have been granted, and the baseflow of 40 cubic feet per second (cfs) is to be achieved no later than April 1, 2006. Table 2-3 shows the proposed implementation schedule for the LORP.

TABLE 2-3
PROPOSED LORP IMPLEMENTATION SCHEDULE

Task	Approximate Date
LORP EIR/EIS AND APPROVAL PROCESS (Section 1.3)	
Issue final EIR/EIS	June 23, 2004
LADWP/Inyo County project approvals EPA issues Record of Decision	August 2004
30-day NEPA no-action period	September 2004
PUMP STATION (Section 2.4)	
Final design for pump station completed	July 2004
Construction (12 months)	Begin in Fall 2004/Winter 2005
LORP POWERLINE (Section 2.4)	
Construction (3 months)	Fall 2004/Winter 2005
PROJECT PERMITS (Section 1.4)	
Permit applications, agency review, & permit issuance	Ongoing
FEDERAL AGENCY CONSULTATIONS (Section 1.4)	
Agency consultation, review, & determinations	Ongoing
WORK PRIOR TO RELEASES TO RIVER CHANNEL	
Clear channel, modify River Intake, upgrade other intakes & spillgates, install staff gages and culverts (Section 2.3)	Begin in Fall 2004/Winter 2005
Install fences (Section 2.8)	Spring 2005 to Winter 2006
PREPARATION AT BLACKROCK AREA (Section 2.7)	
Modify or replace gates, construct berms, modify ditches, install fences, begin flow releases	Fall 2004
RELEASE FLOWS TO RIVER (Section 2.3)	
Initiate Phase 1 flows	No later than 6 months after all permits have been granted
Achieve baseflow of 40-cfs	No later than April 1, 2006
Release first seasonal habitat flow	Winter 2006/2007

2.3 LOWER OWENS RIVER RIVERINE-RIPARIAN SYSTEM

2.3.1 Objectives

The overall objective of rewatering the river is to restore aquatic and riparian habitats of the river from the River Intake to the proposed pump station, located at the upper end of the Owens River Delta (Figures 2-1a - e). A continuous flow of approximately 40 cfs will be established and maintained in the river channel from the River Intake to the LORP pump station near the Owens River Delta. This reach is approximately 62 river miles and 33 linear miles long. A seasonal habitat flow (with a total flow ranging from 40 to 200 cfs depending on the predicted amount of annual Owens Valley runoff) will also be released to the river each spring. The goal for the Lower Owens River Riverine-Riparian System is to create and sustain healthy and diverse riparian and aquatic habitats and a healthy warm water recreational fishery with healthy habitat for native fish species. Diverse natural habitats will be created and

maintained through flow and land management, to the extent feasible, consistent with the needs of the "habitat indicator species" for the riverine-riparian system that are identified in the LORP Action Plan.

2.3.2 Background

At present, all flows in the Owens River channel are diverted into the Los Angeles Aqueduct (Aqueduct) at the River Intake for delivery to the City of Los Angeles for municipal and industrial uses, and there are no releases from the Aqueduct downstream of the River Intake with the following exceptions (see also Table 2-4):

- Diversions to the Aqueduct at the River Intake and at downstream locations are curtailed when the capacity of the Aqueduct downstream of the diversion is exceeded due to inflows from runoff and rainfall. Under these conditions, the flow in the river is released through the River Intake structure. Since 1980, these releases have occurred in 1982, 1983, and 1986. The duration of the releases lasted until the high runoff declined sufficiently so that the flows no longer exceeded the capacity of the Aqueduct.

- Diversions to the Aqueduct at the River Intake are reduced or discontinued, and downstream releases are made from the Aqueduct in emergencies, such as in 1989 and 2003 when flash floods filled the Aqueduct with rocks and sediment.

- Diversions to the Aqueduct at the River Intake are reduced or discontinued and downstream releases may be made from the Aqueduct when the Aqueduct is temporarily shut down for maintenance. This occurs on an as needed basis and the duration can vary from days to weeks. Typically, one release is made per year with a 2 to 4 week duration.

- Releases downstream of the River Intake are made from the Aqueduct to support grazing operations for leases along the Lower Owens River. Some of these releases periodically reach the river between Billy Lake and Alabama gates (see Figure 2-1e).

- Releases are currently made from the Aqueduct at the Independence, Locust, and Georges spillgates (see Figures 2-1b and c) to provide water to the river for fish and habitat purposes under an "Enhancement/Mitigation Project" called the "Lower Owens River Rewatering Project" that was initiated by the LADWP and the County in 1986. The releases under that project will be replaced by the releases under the LORP.

- Releases are made from the Aqueduct at the Blackrock, Thibaut, and Independence spillgates (see Figure 2-1b) to provide water to Twin Lakes, Thibaut Ponds, Goose Lake, and Billy Lake for purposes of maintaining game fish and wetland/wildlife habitat. These releases will continue after implementation of the LORP. However, the source of supply to Goose Lake will be alternated during years when the Waggoner Unit is dry (see Sections 2.5.10.1 and 2.6.4).

- Releases are made at two locations (Lubkin Canyon and Cartago spillgates) from the Aqueduct that are adjacent to the west shore of Owens Lake for dust control purposes or measures.

The current total average annual releases from the LADWP spillgates described above are approximately 20 cfs. Currently, other inflows to the Lower Owens River consist of intermittent winter and spring runoff from tributary streams and groundwater seepage to the channel in certain reaches. Much of the project reach contains degraded habitat conditions due to historic diversions from the river. Existing conditions include:

- General absence of riparian woodland on the dry reach of the river above Mazourka Canyon Road.
- Absence of open water and game fish above Mazourka Canyon Road.
- Continual low flows with little variation below Mazourka Canyon Road, which promotes the accumulation of bulrush and cattails.
- Excessive beaver activity along the wet reach, which reduces tree cover and impounds water, causing high summertime water temperatures.
- Excessive accumulation of organic sediments below the Billy Lake Return ditch due to lack of scouring flows.

2.3.3 Water Release Facilities

Under most circumstances, water would be released to the river for the LORP from the existing River Intake structure located along the river south of Tinemaha Reservoir (Figure 2-1a). The concrete structure was completed in 1913. It currently blocks the river channel, impounds the water and diverts flows by gravity to the nearby Aqueduct Intake to the Los Angeles Aqueduct.

In addition to the River Intake, water may be released to the river through several of the existing spillgates along the Los Angeles Aqueduct (downstream of the River Intake), if necessary, to achieve the required river baseflow. A summary of these spillgates and a description of current releases from the spillgates are provided in Table 2-4. Water could be released from these spillgates to augment the baseflow in the river, if needed. Under the LORP, the principal point of release to the river will be at the River Intake; therefore, the amounts of the current releases from the spillgates (shown in Table 2-4) may be reduced once the LORP is implemented.

The River Intake is 300 feet long and consists of 28 concrete spillway cells (six spillgates and 22 floodgates). Each of the six spillgates is approximately 8 feet wide by 8.5 feet high, and has the capacity to pass up to 200 cfs. Each of the 22 floodgates is approximately 9 feet wide by 4 feet high, and has the capacity to pass up to 125 cfs. A wooden walkway is present along the top of the structure.

The three spillgates at the western end of the structures (Spillgates Nos. 1, 2, and 3) have not been used for the past 25 years, and their steel radial gates have been removed. The three spillgates at the eastern end of the structure (Spillgates Nos. 4, 5, and 6) contain manually operated steel radial gates that are used to release water into the river. Each gate has a capacity of about 160 to 200 cfs. These gates are infrequently used to release water to the river, as noted above in Section 2.3.2.
The old river channel, located directly downstream of the diversion is mostly devoid of vegetation. Spoil piles composed of sediments periodically removed from the river above the River Intake are placed along the western and eastern banks of the river (upstream of the diversion structure).
Under LORP, the River Intake structure will be modified by installing a 20-foot wide automated gate approximately 75 feet downstream from the existing spillgates Nos. 4, 5, and 6. The new gate would be capable of conveying up to a maximum of 200 cfs with adjustments in releases of 1 cfs up to 200 cfs.

The installation of the new automated gate would require the following construction activities, which are anticipated to require about 120 to 150 days:

- Construction of a temporary cofferdam on the upstream side of the diversion, around spillgates Nos. 4, 5, and 6.

- Construction of a 30-foot long wing wall (concrete) on the east side of the spillgates Nos. 4, 5, and 6.

- Raising of the existing steel radial gate in spillgate No. 5 to the fully opened position and permanently anchoring the gate in this position. (The existing radial gates in spillgates Nos. 4 and 6 will be normally closed unless more flows are needed to augment flow to the new automated gate.)

- Installation of the new automated gate would include installation of a new hardened concrete sluice (approximately 28-foot wide and 85-foot long) to the downstream face of spillgates # 4, 5, & 6.

- A 225-foot long concrete spillway channel will be constructed downstream from the new automated gate to protect a flow metering station from vegetative overgrowth and submersion and excessive scouring during high flow conditions.

- Construction equipment would access the east side of the river by an existing dirt road that extends across the currently dry river channel. This existing dirt road will be elevated by approximately 3 to 4 feet using compacted native soil road base to prevent wash out and scour during high flows. New culverts will be installed under the road, and the approach to the existing rail car bridge will be reinforced by rip-rap armoring.

- An existing steel rail car bridge (approximately 11-foot wide and 52-foot long) will be rehabilitated and reinstalled on new bridge abutments approximately 175 feet downstream from spillgates Nos. 4, 5, and 6. A flow metering station will be installed in the same location to replace the existing station.

- Construction equipment would include pickup trucks, water trucks, weld trucks, tracked excavator, pitman crane, American Lattice boom crane, concrete delivery trucks, supply/ material delivery trucks, and excavating equipment (backhoe or G-100 Gradall®).

TABLE 2-4
SUMMARY OF CURRENT SPILLGATE OPERATIONS IN THE LORP PROJECT AREA

Spillgate [see Figures 2-1a to e for locations]	Purposes of Current Releases	Current Release Regime (avg monthly flow unless otherwise noted)	Distance from Los Angeles Aqueduct to Owens River (channel miles)	Distance from Pump Station Site (miles)
Blackrock Spillgate	Water for livestock on Twin Lakes and Blackrock leases using Blackrock, Winterton, and Waggoner ditches; maintain water in Twin Lakes and Goose Lake; release excessive flows in the Aqueduct due to high inflows	6.4 cfs (1986-2001 avg), year-round	3.4 miles in well-defined channel; currently, no water reaches the river	56.1 miles
Thibaut Spillgate	Water for livestock; irrigation for pastures on Thibaut Lease and to maintain Thibaut Ponds; stockwater; release excess flows in above average runoff years	1-2 cfs (1986-2001 avg), year-round	No connection to the river; water remains in Thibaut Pasture	Not applicable
Independence Spillgate	Water to maintain Billy Lake and to support fish in the river under the 1986 Lower Owens River Rewatering Project; Release excessive flows in the Aqueduct due to high inflows; Aqueduct maintenance; spreading of water in	4.7 cfs (1986-2001 avg), year-round	3 miles; conveyed from Long Pond to Independence channel, to Billy Lake, then to Billy Lake Return near Mazourka Canyon Road in well-defined channels	38.0 miles

Spillgate [see Figures 2-1a to e for locations]	Purposes of Current Releases	Current Release Regime (avg monthly flow unless otherwise noted)	Distance from Los Angeles Aqueduct to Owens River (channel miles)	Distance from Pump Station Site (miles)
	above average runoff years			
Dean Spillgate	Water for livestock on Blackrock lease in Steven's Ditch; spreading of water in above average runoff years	< 1 cfs	No direct connection to the river; water in Steven's Ditch eventually reaches the river at George's Ditch Return	Not applicable
Russell Spillgate	Water for livestock on Blackrock lease in Steven's Ditch; spreading of water in above average runoff years	< 1 cfs	No direct connection to the river; water in Steven's Ditch will eventually reach the river at George's Ditch Return	Not applicable
Locust Spillgate	Water for livestock on Blackrock lease in Locust Ditch and Steven's Ditch; release excessive flows in the Aqueduct due to high inflows; Aqueduct maintenance; spreading of water in above average runoff years	5.4 cfs (1986-2001 avg) year-round	1.5 miles; conveyed through Steven's Ditch to river in well-defined channel	31 miles
Georges Spillgate	Water for livestock on Blackrock lease in Steven's Ditch and Georges Ditch; irrigation for pasture; releases for fish; release excessive flows in the Aqueduct due to high inflows; Aqueduct maintenance; release excess flows in above average runoff years	2.1 cfs (1986-2001 avg) year-round	1.9 miles; direct connection through George's Ditch to river in well-defined channel	24.8 miles
Alabama Spillgate	Release excessive flows in the Aqueduct due to high inflows; Aqueduct maintenance; release excess flows in above average runoff years; emergency spills	Approximately 200 cfs for 2 hours, 4-6 times/year	0.5 to 1.5 miles through various poorly defined channels and wetlands in the "Islands"	17.5 miles

2.3.4 Required River Flows and Habitat Indicator Species

Baseflows

As required by the MOU, a continuous flow of approximately 40 cfs will be maintained from the River Intake to a pump system located near the river delta at Owens Lake. The pump system will capture and pump the water either to Owens Lake for use in the implementation of dust control measures on Owens Lake or to the Los Angeles Aqueduct for export. The MOU provides that any water in the river that is above the amount required in the MOU for release to the Owens River Delta may be captured by the pump station. The specified flow regime in the MOU is as follows:

> *(i) A base flow of approximately 40 cfs from at or near the Intake to the pumpback system to be maintained year round.*

(ii). A seasonal habitat flow. It is currently estimated that in years when the runoff in the Owens River watershed is forecasted to be average or above average, the amount of planned seasonal habitat flows would be approximately 200 cfs, unless the Parties agree upon an alternative habitat flow, with higher unplanned flows when runoff exceeds the capacity of the Los Angeles Aqueduct. (The runoff forecast for each year would be DWP's runoff year forecast for the Owens River Basin, which is based upon the results of its annual April 1 snow survey of the watershed.) In years when runoff is forecasted to be less than average, the habitat flows would be reduced from 200 cfs to as low as 40 cfs in general proportion to the forecasted runoff in the watershed….

(iii) A continuous flow in the river channel will be maintained to sustain fish during periods of temporary flow modifications.

The baseflow of approximately 40 cfs from the River Intake to the pump station will be maintained year-round. Initially, the baseflow of 40 cfs will be verified by measurements at the temporary stream gages described in Section 2.3.5.2. Once the 40-cfs baseflow has been established, it will be verified at a minimum of four permanent stream gages located along the river, as specified in the MOU. The permanent gaging sites will be established before monitoring at the temporary sites is discontinued. The baseflow will be managed to maintain the required approximately 40-cfs flow throughout the river.

Except for temporary flow decreases or increases resulting from operational or maintenance activities, the parties to the MOU would have to agree to any decrease or increase in the 40 cfs baseflow specified in the MOU. Since the baseflow addressed in this EIR/EIS for the riverine-riparian system is approximately 40 cfs, if the baseflow were to be substantially changed, additional CEQA and NEPA compliance may be necessary.

Seasonal Habitat Flows

Annual seasonal habitat flows are intended to create a natural disturbance to establish and maintain native riparian vegetation and channel morphology. The MOU states the following purpose of the seasonal habitat flows (also called "riparian" flows):

> "To achieve and maintain riparian habitats in a healthy ecological condition, and establish a healthy warm water recreational fishery with habitat for native species, the plan would recommend habitat flows of sufficient frequency, duration and amount that would (1) minimize the amount of muck and other river bottom material that is transported out of the riverine-riparian system, but would cause this material to be redistributed on banks, floodplain 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 objectives; and (7) enhance the river channel."

Habitat Indicator Species

The MOU states that: "*The goal for the Lower Owens River Riverine-Riparian System is to create and sustain healthy and diverse riparian and aquatic habitats, and a healthy warm water recreational fishery with healthy habitat for native fish species. Diverse natural habitats will be created and maintained through flow and land management, to the extent feasible, consistent with the needs of the 'habitat indicator species' for the riverine-riparian system."* The habitat indicator species for the river that are identified in the LORP Action Plan are listed in Table 2-5. They include non-native game fish and a variety of native, resident and migratory riparian and water birds. Although the primary goal of the

rewatering of the Lower Owens River is to restore a warm water fishery (i.e., non-native game fishery), the Action Plan states that consideration should be given to the needs of the native fish that once inhabited the river.

TABLE 2-5
LORP HABITAT INDICATOR SPECIES: RIVERINE-RIPARIAN SYSTEM

Fish	Birds and Mammal
Non-native game fish:	Yellow warbler
Largemouth bass	Willow flycatcher*
Smallmouth bass	Yellow-breasted chat
Bluegill	Blue grosbeak
Channel catfish	Yellow-billed cuckoo*
	Warbling vireo
Native fish:	Tree swallow
Owens sucker	Belted kingfisher
	Nuttall's woodpecker
The MOU states that other species would also receive proper consideration: Owens pupfish*, Owens tui chub*, and Owens speckled dace.	Long-eared owl
	Swainson's hawk
	Red-shouldered hawk
	Northern harrier
	Rails
	Least bittern
	Marsh wren
	Wood duck
* *State or Federal threatened or endangered species.*	Great blue heron
	Owens Valley vole

2.3.5 Proposed Release Regime

2.3.5.1 Basis for Establishing 40 cfs Baseflow

In July 1993, Ecosystem Sciences conducted a field experiment along the Lower Owens River to gather data on flows and water quality for use in developing a proposed release regime and to calibrate hydrological, biological, and water quality models for predicting flow requirements for the Lower Owens River. The results of this study are described in detail in Section 4.0.

The 1993 study was very short-term, therefore, the results of the study must be considered with this limitation in mind. The study indicated that significant flow losses (via evaporation and percolation to the shallow alluvial aquifer) must be accounted for when designing a release regime, particularly in the early years of the LORP when losses to the unconfined shallow aquifer under and adjacent to the river will be greatest. In order to achieve the target baseflow of 40 cfs, higher releases may be necessary from the River Intake, as well as possible augmentation of flows from the Aqueduct spillgates. The study also indicated that flows can potentially degrade water quality and conditions for fish, at least initially, due to scouring of old organic sediments (muck) on the riverbed below Mazourka Canyon Road (Figure 2-1c).

Following the 1993 controlled flow study, Don Chapman Consultants (1994) conducted various modeling analyses to develop a release regime. The analyses indicated that a 40-cfs baseflow would provide suitable habitat for game fish, forage fish, and native fish in the Lower Owens River, and that a 200-cfs seasonal habitat flow would provide significant out-of-bank flooding to stimulate germination of willows and spread organic material on the floodplain. The analyses suggested that once the groundwater and

bank storage areas are stabilized, the variability in the 40-cfs baseflow would be about plus or minus 5 cfs (i.e., 35 to 45 cfs).

2.3.5.2 Initiating Baseflow – Proposed Release Regime

The proposed two-phase release schedule is designed to: (1) allow for the release of water to the river as soon as possible without adversely affecting the construction of the pump station diversion structure, and (2) achieve a baseflow of approximately 40 cfs throughout the river as soon as possible after the completion of construction of the pump station. The two phases and the planned schedules for commencing each phase are described below.

TABLE 2-6
FLOW AND WATER QUALITY MONITORING STATIONS

Station (all temporary except for the River Intake, Keeler Bridge, and the Pump Station)	Distance from River Intake (miles)	Monitoring	
		Water Quality	Flows
Below River Intake (permanent station)	0		X
1. Above Blackrock Ditch Return	5.6		X
2. Below Blackrock Ditch Return	5.7		X
3. East of Goose Lake	12.1		X
4. Goose Lake Return	15.1		X
5. 5 Culverts	17.3		X
6. Below Billy Lake Return*	23.6		X
7. Mazourka Canyon Road*	24.1	X	X
8. Below Locust Ditch Return*	30.7		X
9. Manzanar Reward Road*	32.9	X	X
10. Below Georges Ditch Return*	36.9		X
11. Reinhackle Springs*	39.2	X	X
12. Below Alabama Gates Return*	44.2		X
13. Lone Pine Narrow Gage Road*	50.7		X
14. Keeler Bridge* (permanent station)	56.4	X	X
15. Above pump station*	61.0		X
Pump station* (permanent station)	61.7		X

*Stations in the currently wetted reach

Phase 1 Releases

Once LADWP has completed the channel clearing work, the modification of the River Intake structure (including a permanent flow measuring station), and the installation of 14 temporary and 3 permanent flow measuring stations identified in Table 2-6 and several culverts, LADWP will begin releasing water to the Lower Owens River via the River Intake. The Phase 1 releases will occur no later than 6 months after all permits have been granted. Releases will be increased daily in 5-cfs increments until a continuous flow is achieved from the Intake to the Delta. During this phase, flow throughout the Lower Owens River would be the same as has occurred under past practices in the currently wet reach of the river, as indicated by the monthly average flow at Keeler Bridge shown in Chart 4-4 of about 5 to 17 cfs (see Section 4.3.1). Except as to provide a refuge for fish as described below, releases from the spillgates that currently supply the wet reach of the river will be reduced as new flows released from the River Intake are conveyed to the wet reach.

Phase 2 Releases (40 cfs)

Once construction of the pump station is completed, LADWP will ramp the flows as rapidly as possible while attempting to avoid adverse impacts on fish. Releases from the River Intake will be supplemented as necessary by various spillgates, until a 40 cfs baseflow is achieved from the Intake to the pump station site. As required by the February 2004 Stipulation and Order, the baseflow of 40 cfs will be achieved no later than April 1, 2006. Flow adjustments based on the monitoring and thresholds described below will be conducted once the releases commence. An additional 6 months may be required to stabilize a baseflow of approximately 40 cfs throughout the channel.

Water Quality Monitoring and Spillgate Releases

During Phase 1 and Phase 2, water quality data will be collected at the four monitoring stations identified in Tables 2-6 and 2-7, with the monitoring frequencies identified in Table 2-8. Water quality constituents to be measured at the monitoring stations will include electrical conductivity, dissolved oxygen, pH, turbidity, temperature, ammonia, hydrogen sulfide, and tannins and lignins.

If it is determined that a water quality threshold or fish condition identified in Table 2-9 has been exceeded at a monitoring station, water will be released to the river through the spillgate linked to that monitoring station to create a refuge for fish in the spillgate channel and at the confluence with the river below the spillgate channel. If monitoring indicates that the trend in water quality is downward toward any of the thresholds, water may be released to the river through the linked spillgate in anticipation of reaching the water quality threshold. Once operation of a spillgate is commenced, water quality monitoring by spot measurements will be conducted in the river below the spillgate channel. Monitoring below spillgate channels will be in addition to the water quality monitoring at the four monitoring stations.

Operation of the three spillgates to create refuges for fish will be discontinued when: (1) water quality at the monitoring station linked to the spillgate and at the confluence with the river below the spillgate channel rises above the water quality thresholds, or (2) fish at the monitoring stations are not exhibiting signs of stress. If releases from one or more of these spillgates are required, flows to the river will be adjusted so that approximately 40-cfs are maintained.

TABLE 2-7
WATER QUALITY MONITORING STATIONS

Monitoring Station	Linked Spillgate	Equipment
Mazourka Canyon Road	Independence	Spot measurement
Manzanar Reward Road	Georges	Continuous recorder
Reinhackle Springs	Alabama	Spot measurement
Keeler Bridge*	None	Continuous recorder

* The Keeler Bridge Station is for water quality tracking purposes only, and is not linked to a spillgate and, thus, the water quality thresholds do not apply to Keeler Bridge.

TABLE 2-8
WATER QUALITY MONITORING FREQUENCY

Time Period	Monitoring Frequency
Baseflows	
1 month prior to Phase 1	3 days per week
Phase 1	1 to 2 days per week (depending on conditions)
Phase 2	1 to 5 days per week (depending on conditions) during the period when spillgates may be operated (see above)
Post-Phase 2	1 to 5 days per week (depending on conditions) for 6 months after 40-cfs baseflow has been established
Seasonal Habitat Flows (first three releases in excess of 40 cfs)	
During Seasonal Habitat Flows	5 days per week
After Seasonal Habitat Flows	1 to 5 days per week (as needed) for up to 2 weeks

TABLE 2-9
WATER QUALITY AND FISH CONDITION THRESHOLDS

Constituent or Observation	Threshold	Source
Dissolved oxygen	1.5 mg/l and downward trend in data	USFW, 1982 (1.0 mg/l)
Hydrogen Sulfide	0.030 mg/l	96 hour LC_{50} for adult bluegill 0.045 mg/l (Smith et al, 1976)
Ammonia	Acute Criterion (one-hour average concentration) for Non-Salmonids (pH dependent)	EPA, 1999
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.	

2.3.5.3 Seasonal Habitat Flows

The first seasonal habitat flow will be released in the winter immediately following the completion of the pump station construction. The magnitude of the first seasonal habitat flow will be 200 cfs at peak flow, regardless of forecasted runoff. The first seasonal habitat flow will be ramped up from the 40 cfs baseflow to reach a peak flow of 200 cfs in 7 days, then ramped back down to the 40 cfs baseflow in 7 days. The first seasonal habitat flow will be released in the winter (i.e., when temperatures are lower) to reduce the potential for substantial decreases in dissolved oxygen and adverse effects on fish health.

After the first seasonal habitat flow, subsequent annual seasonal habitat flows will be released in May or early June, to coincide with seed production by willows and cottonwoods in the floodplain, thereby providing an opportunity to stimulate growth of new trees on the floodplain adjacent to the river channel. The exact timing will be determined each year based on an assessment of the projected timing of the cottonwood and willow seeding, which varies from year to year depending on temperature, rainfall, and other environmental factors.

After the first seasonal habitat flow, the amount of each annual seasonal habitat flow will be determined each year based on forecasted runoff conditions. As part of its operations, LADWP uses a Runoff Forecast Model to predict each year's water supply for the Aqueduct based on the results of snow surveys, precipitation data, and weather forecasts. Snow surveys consist of measuring depth and water content of snow in the Eastern Sierra Nevada Mountains. The forecasts correspond to the runoff year (April 1 to March 31).

Chart 2-1 shows the relationship between the magnitude of seasonal habitat flow (at peak flow) and the forecasted runoff condition, expressed as percent of normal runoff. Normal runoff is defined as the mean of annual runoff volume over 50 years, and is adjusted every 5 years. For example, normal runoff for 2004 is the mean of annual runoff for 1950-1951 to 1999-2000 water years. In April of 2005, a new normal runoff will be recalculated based on the record from 1955-1956 to 2004-2005.

No flows above the 40-cfs baseflow will be released from the River Intake in years when the runoff is predicted to be 50 percent or less of the annual average (normal) runoff. If runoff is greater than 50 percent of normal, the amount of the seasonal habitat flows will increase proportionally in accordance with Chart 2-1, up to a maximum release of 200 cfs. When runoff is 100 percent of normal or greater, the peak seasonal habitat flow will be 200 cfs. Seasonal habitat flows will be established annually by the Standing Committee in accordance with the provisions of the MOU and using Chart 2-1 (Nomograph of Seasonal Habitat Flows) and based on LADWP's Runoff Forecast Model for the Owens Valley.

As shown in Chart 2-1A, 50 percent of normal runoff represents extremely dry years that occur infrequently. The sloping portion of the nomograph in Chart 2-1 begins at 50 percent of normal, since it is close to the lowest runoff observed in the past. During the 50-year period between 1950 and 2000, runoff near or below 50 percent of normal has occurred only four times. Runoff near or below 75 percent of normal has occurred 17 times. Runoff above or near 100 percent of normal has occurred 22 times. The magnitude of the seasonal habitat flow is in general proportion to the forecasted runoff so that it is in line with the natural weather patterns and emulates the runoff pattern experienced in the river above the River Intake. Thus, not releasing flows above 40 cfs when runoff is 50 percent or less of normal (i.e., extremely dry years) is consistent with this approach and the general proportionality requirement of the MOU.

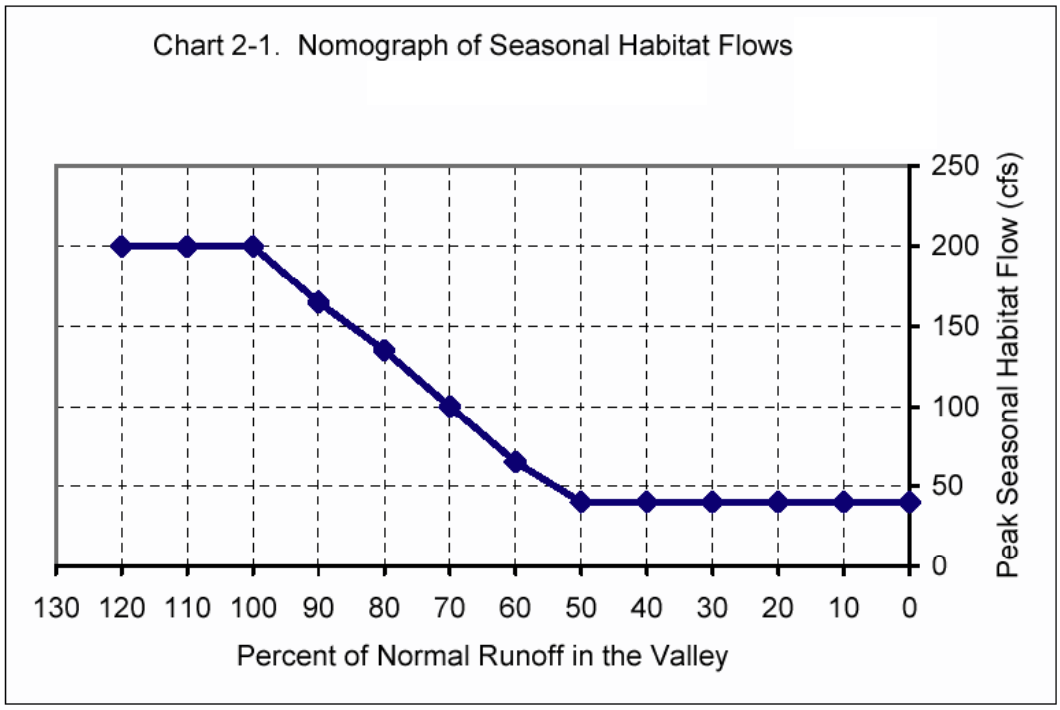
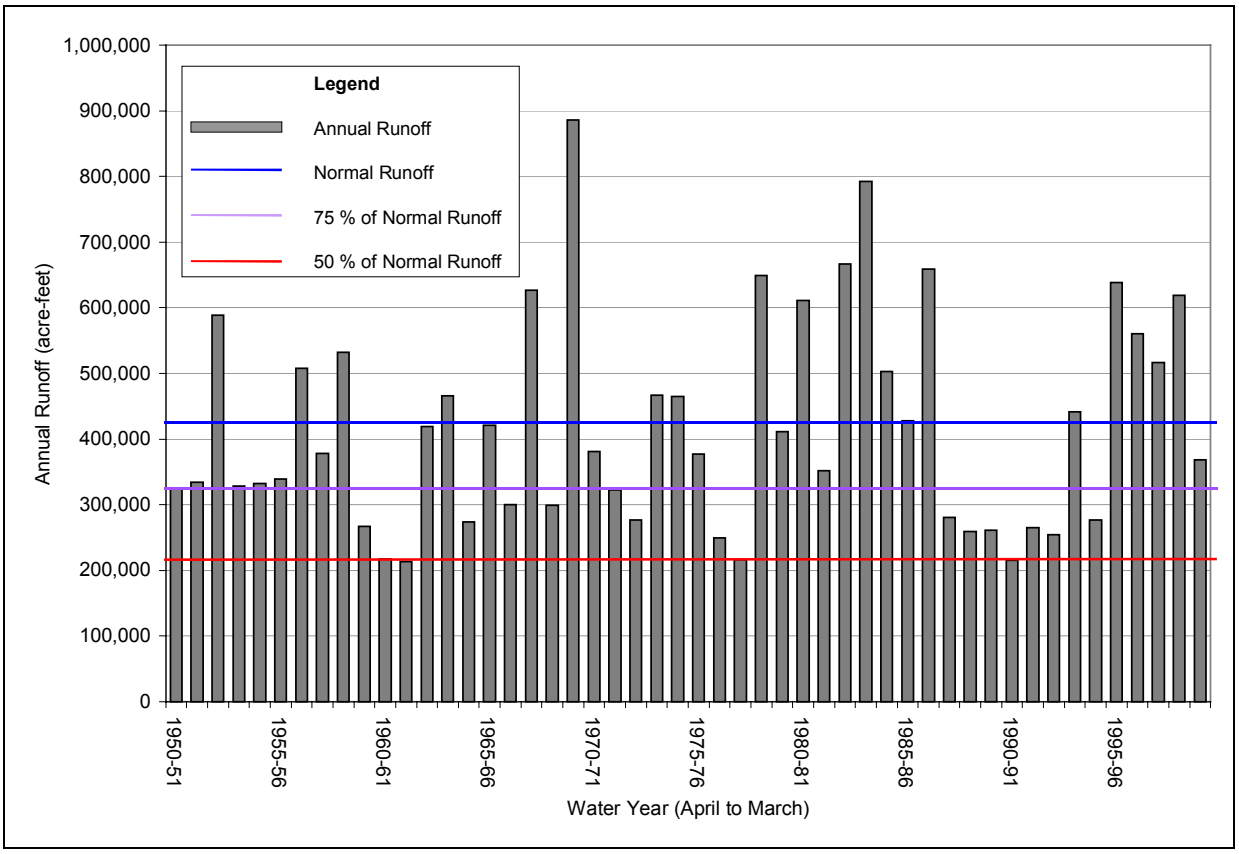


CHART 2-1A
OWENS VALLEY ANNUAL RUNOFF (1950-1951 TO 1999-2000 WATER YEARS)



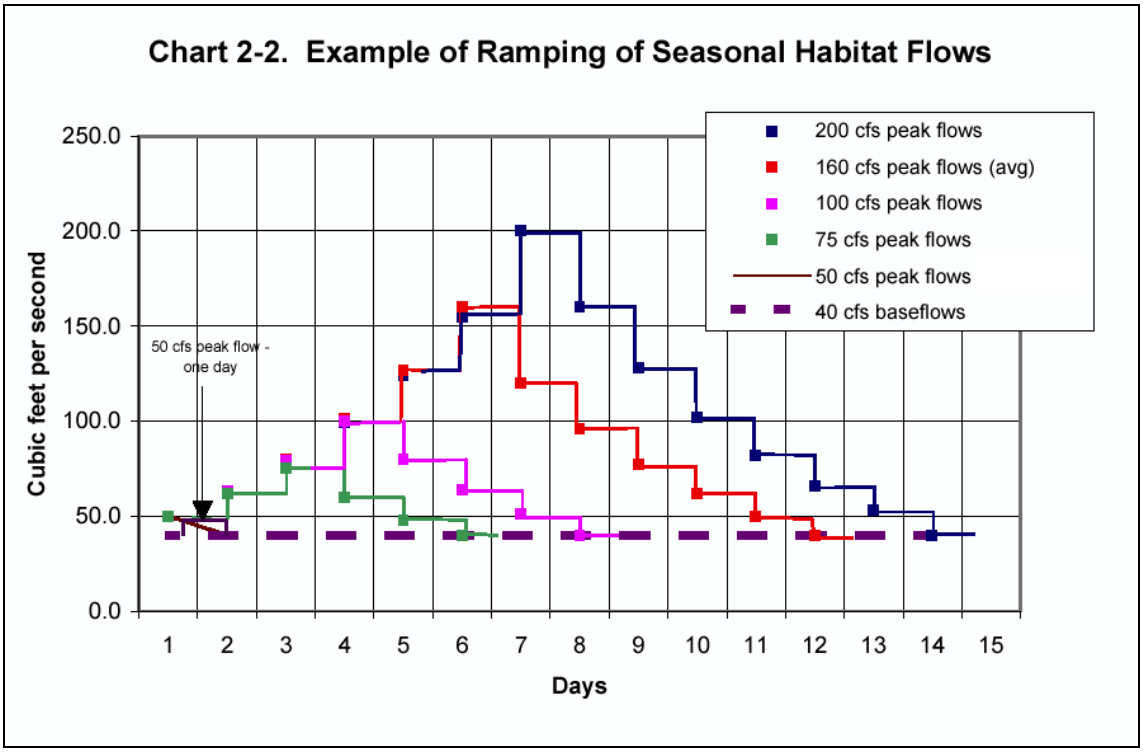
Source: LADWP, Unpublished Data. 1950 to 2000.

The volume of water reaching the pump station would be reduced by evapotranspiration, percolation, flows overtopping the river channel, and other channel losses. Seasonal habitat flows not captured by the pump station will flow to the Owens River Delta. Over the life of the project, it is expected that the annual average and median seasonal habitat flows, based on an analysis of 62 years of existing runoff records in the Owens Valley and using the graph shown in Chart 2-1, will be 150 and 180 cfs, respectively (Inyo County Water Department, Randy Jackson, pers. comm.).

The seasonal habitat flows will be released from the River Intake and will not be augmented by water released from spillgates downstream of the River Intake, except as noted in Section 2.3.5.4. The amount of water released from the River Intake for the seasonal habitat flows will be ramped up from the 40 cfs baseflow to reach the peak flow and back down to the baseflow rate in accordance with a specified ramping schedule. Flow will be increased daily by approximately 25 percent or more until the target peak flow is achieved. The target flows will be maintained for 1 day, then flows will be decreased by approximately 20 percent each day. An example of the ramping schedule for different flows is shown on Chart 2-2. The number of days of flows above 40 cfs will range from 1 day for a 50-cfs peak flow, to 6 days for a 75-cfs peak flow, to 14 days for a 200-cfs peak flow. Seasonal habitat flows will be ramped up starting from the 40-cfs baseflow to achieve the specified seasonal habitat flow magnitude for that year. For example, if a seasonal habitat flow of 200 cfs is specified, flows will increase 160 cfs above the 40-cfs baseflow to achieve a peak magnitude of 200 cfs.

The proposed flow ramping schedule is generally designed to emulate the characteristics of natural flood events, which include a gradual rise and decline in flow. The gradual rise and fall is designed to prevent entrapment of fish and to allow water to spread outside of the channel then gradually recede to allow time for sediments and seeds of riparian woody species to be deposited onto the floodplain and groundwater to be recharged. Based on monitoring of flows and habitat development, the currently proposed ramping schedule will be adjusted, if necessary, as part of adaptive management (see Section 2.10).

Chart 2-2. Example of Ramping of Seasonal Habitat Flows



The amount of water released under the maximum seasonal release regime (i.e., 200 cfs) is estimated to be 2,778 acre-feet (see Table 2-10).

TABLE 2-10
ESTIMATE OF WATER RELEASED TO THE RIVER
FOR VARIOUS SEASONAL HABITAT FLOWS

Day	Released to the River with Different Peak Flows* (acre-feet)				
	200 cfs Peak Flow	160 cfs Peak Flow	100 cfs Peak Flow	75 cfs Peak Flow	50 cfs Peak Flow
1	99	99	99	99	99
2	125	125	125	123	
3	157	157	157	149	
4	198	198	198	119	
5	246	246	159	95	
6	307	317	127	79	
7	397	238	101		
8	317	190	79		
9	254	153			
10	202	123			
11	163	99			
12	131	79			
13	105				
14	79				
Total =	2,780	2,024	1,045	664	99

* Flows will be increased each day, starting with the 40 cfs baseflow, over a 1-hour period. Total quantity of water calculated as 1 cfs for 1 day = 1.98 AF.

2.3.5.4 Water Quality Monitoring for Seasonal Habitat Flows

Prior to the release of the first three seasonal habitat flows that are in excess of 40 cfs, water quality will be monitored at the four monitoring stations listed on Table 2-7. During the first three releases of flows that are in excess of 40 cfs, water quality will be measured 5 days per week during the seasonal habitat flows, then 1 to 5 days per week (depending on conditions) for up to 2 weeks after the seasonal habitat flows.

The following water quality parameters will be measured: electrical conductivity, dissolved oxygen, pH, turbidity, temperature, ammonia, hydrogen sulfide, and tannins and lignins. After the first three flow releases, water quality monitoring will be discontinued.

If it is determined that a water quality threshold identified in Table 2-9 has been exceeded at a monitoring station, water will be released to the river through the spillgate linked to that monitoring station to create a refuge for fish in the spillgate channel and at the confluence with the river below the spillgate channel. If monitoring indicates that the trend in water quality is downward toward any of the thresholds, water may be released to the river through the linked spillgates in anticipation of reaching the water quality thresholds. The amount and duration of supplemental water will depend on the severity of the observed water quality degradation. Once operation of a spillgate is commenced, water quality monitoring by spot

measurements will be conducted in the river below the spillgate channel. Monitoring below spillgate channels will be in addition to the water quality monitoring at the four monitoring stations.

Operation of the three spillgates to create refuges for fish will be discontinued when (1) water quality at the monitoring station linked to the spillgate and at the confluence with the river below the spillgate channel rises above the water quality thresholds, or (2) fish at the monitoring stations are not exhibiting signs of stress.

2.3.6 Channel Clearing Prior to Phase 1 Releases

Periodic and intermittent flow releases from the River Intake in the recent past have created obstructions (i.e., "plugs") in the river channel immediately downstream of the River Intake (Figure 2-2). The channel obstructions consist of scattered concentrations of: (1) organic and inorganic sediments, and (2) dense cattail and bulrush marsh. The latter consists of impenetrable stands on the bottom of the channel. These obstructions will restrict the flow of water when it is released from the River Intake, potentially causing overbank flooding. In order to ensure successful and efficient establishment of the 40-cfs baseflow and seasonal habitat flows, LADWP proposes to remove these obstructions.

Prior to initiating the Phase 1 releases, LADWP will mechanically remove sediments and marsh vegetation obstructions from 10,800 feet (approximately 2 miles) of the river channel downstream of the River Intake. It is estimated that approximately 7,800 cubic yards of sediment and organic material will be removed. The depth of excavation will be about 1 to 2 feet on average. A 15-foot wide swath will be excavated within the middle of the existing 40-50 foot wide channel to allow 40 cfs to pass. It is anticipated that the 40-cfs baseflow, coupled with seasonal habitat flows up to 200 cfs, will generate enough erosive force to remove the remaining material.

All channel clearing work will occur from the west bank using a tracked excavator. Both banks will remain undisturbed. Excavated material will be placed directly into dump trucks, and then hauled to a permanent sediment stockpile area adjacent to the River Intake (Figure 2-2). A temporary 20-foot wide haul road will be established on the top of the west bank for the excavator and trucks. It will be created by driving over the existing vegetation in flat areas, and by minor grading where the terrain is uneven. Several temporary roads will be created perpendicular to the main haul road to provide access to an existing dirt road along the Aqueduct (Figure 2-2). These roads will be restored to pre-construction grade and revegetated.

Approximately six trucks will be used in the operation (four 4-cubic yard trucks and two 8-cubic yard trucks). The amount of material removed and hauled will range from 192 to 288 cubic yards per day, requiring about 32 to 48 truck round trips per day. Work will occur after project approval and will require 4 months to complete.

In 2003, LADWP and Ecosystem Sciences examined the river for significant obstructions (Ecosystem Sciences, 2003b). These obstructions will be removed only if they would significantly impede flows. Known obstructions to be removed prior to the commencement of releases for the Phase 1 baseflows are listed below.

- Several 36-inch diameter steel pipe culverts at the "5 Culverts" crossing (Figure 2-1b) would be replaced with larger culverts (60 inch diameter) to increase capacity.

- Beaver dams that significantly obstruct flows will be breached by a helicopter-mounted Grabber or by hand to allow a more unrestricted flow. Debris from the dams would be placed in the floodplain for wildlife use and decomposition (see Section 2.3.7).

- Three instream rock dams between "5 Culverts" and Mazourka Canyon Road (Figures 2-1b,c) would be mechanically removed with heavy equipment (e.g., loader, excavator) and the debris would be trucked off site for proper disposal.

- Additional structures in the channel that may be removed or modified to accommodate the proposed flows include bridge abutments near Blackrock Ditch Return (Figure 2-1a), Mazourka Canyon Road culverts (Figure 2-1c), Manzanar Reward Road culverts (Figure 2-1c), an earthen dike located between Billy Lake Return and Locust Return (Figure 2-1c), and Lone Pine Narrow Gauge Road culverts (downstream of Lone Pine Pond, Figure 2-1e).

- Saltcedar slash (cuttings of saltcedar that have been piled in and around the channel as part of the Inyo County Saltcedar Control Program) will be removed by Inyo County from channel where it may impede flows or riparian recruitment.

As a best management practice to reduce potential water quality impacts, tules and other vegetation debris removed during initial channel clearing will be moved out of the channel to the extent possible to reduce the amount of organic materials that could potentially consume oxygen during initial flow releases.

2.3.7 Beaver Dam Removal and Beaver Control

Beavers are abundant along the existing wetted portion of the river and many of its tributaries. High concentrations of dams are located at the Locust Ditch Return, Georges Ditch Return, the Island Reach, and from upstream of the Lone Pine Ponds to below Keeler Bridge. The dams create significant backwater areas, which promote tule growth, as well as open-water rearing habitat for bass and bluegill. Beavers consume riparian vegetation and alter the hydrology of the river, which can adversely affect native riparian vegetation, especially woody species. Beaver dams within the LORP area have resulted in the continuous inundation of riparian woodlands and the loss of vigor and death of a significant number of willow trees. Beavers are an exotic species not native to the Owens Valley. The presence of significant beaver activity in the LORP area will inhibit achievement of the goals of the LORP and may negatively impact the health of the Lower Owens River ecosystem.

As an ongoing management activity separate from the LORP, LADWP began removing beaver dams along the river in the spring of 2002. LADWP completed a Mitigated Negative Declaration under CEQA for the beaver dam removal, and signed a 1602 Streambed Alteration Agreement with CDFG. The project described in the Mitigated Negative Declaration included the removal of the majority of beaver dams along the river from the Islands area to the proposed pump station site (Figure 2-3). This program was an extension of LADWP's ongoing beaver management efforts on LADWP lands. The program is described here because the beaver dam removals occurred in the LORP area and will benefit the LORP and these removals exemplify the methods that will be employed under the LORP.

During its review of LADWP's application for a 1602 Agreement, CDFG expressed concern that the removal of beaver dams would impact water quality and cause fish kills, because the dams trap a considerable amount of organic material and muck that could be released upon removal. In August 2001, LADWP, with the County and CDFG, conducted an experimental removal of six beaver dams between the Alabama Gates and Lone Pine Station Road. Dams were removed using a set of pilot-operated Grabber jaws attached via a cable to a helicopter. Dam material was lifted from the dam and deposited outside of the riparian corridor. During this experiment, LADWP and the County monitored water quality parameters (i.e., dissolved oxygen, electrical conductivity, temperature, and turbidity) upstream and downstream of each dam, prior to and immediately after dam removal, and no significant water

quality impacts were observed. A discussion of the results of the water quality measurements is provided in Section 4.4.

LADWP has removed many of the 31 beaver dams that impeded flows in the river channel from the Islands area to the proposed pump station site (see Figure 2-3). Removal of the dams was accomplished by the use of a set of pilot-operated Grabber jaws attached via a cable to a helicopter. Material that was removed and deposited on adjacent upland sites outside of the floodplain that are not subjected to seasonal inundation or river flow. Removal of beaver dams did not require use of explosives, construction of access roads, mechanical dredging, or mechanical clearing of riparian vegetation. Dams were removed incrementally, starting from the pump station site and proceeding upstream. The use of this approach avoided the sudden failure of dams downstream due to a release of impounded water upstream, and minimized the chance of water quality impacts during dam removal. No more than six dams were removed during any 2-day period. Flows in the Owens River were monitored at Keeler Bridge to ensure that no large fluctuations in flow occurred that could have affected fish or water quality. Additional dams were removed only after dam removal-induced flow changes had stabilized.

Beaver dam removal is an ongoing activity that is conducted as additional dams are built or repaired. Prior to the release of flows to the river under LORP, additional beaver dams that are obstructing the channel, if any, and would inhibit the establishment of the proposed flow regime in the river will be removed. In the future, additional beaver dam removal will be implemented in the LORP area if beaver activity is causing excessive flooding, restricting flow significantly, or is inhibiting the development of diverse vegetation types. The methods that will be used to remove beaver dams will be similar to the methods applied in a recent beaver dam removal effort conducted by LADWP, which is described above. Beaver dams will be removed from November through May, when water temperatures are at their lowest, and in accordance with the 1602 Agreement. Beaver dam removal will be accompanied by the trapping and removal of beavers by an authorized trapper.

2.3.8 Fish Management

The Riverine-Riparian element of the LORP was designed to create a wide variety of aquatic habitats that would primarily benefit the existing warm water sport fisheries for largemouth and smallmouth bass, bluegill, and catfish. The project will create fish habitats by forming new and expanded open water in the river, maintaining off-river lakes and ponds, and enhancing corridors between off-channel lakes and ponds and the river. Except as a potential mitigation measure, which could include fish stocking (see Section 4.6), no active management of the fisheries (such as fish rescue, creation of in-stream fish habitat structures, or predator control) is proposed under the LORP.

Under the LORP, flows will be provided in certain existing off-river channels on a year-round basis to provide a long-term connection between the river and off-river lakes and ponds for fish to move freely between the river and off-river areas. No physical modification of the channels will be performed, as Ecosystem Sciences (Technical Memorandum 14, 2001) has determined that such modifications are not necessary to meet the objectives of ensuring hydrologic connection to the river and creating suitable habitat for fish. The channels are described in Section 2.6.4.

2.3.9 Other Management Actions

Channel Sediment (Muck) Management

With the exception of the initial channel clearing near the River Intake (see Section 2.3.6), the LORP does not include any actions to physically remove channel sediments (also called muck) or other organic debris from the river channel either prior to, or after, the establishment of baseflows and the release of seasonal

habitat flows. Ecosystem Sciences (Technical Memorandum No. 9) has postulated that muck will be suspended by seasonal habitat flows in the river.

Tule Management

The wetted portion of the Lower Owens River (downstream of Mazourka Canyon Road) supports extensive and dense stands of bulrushes (*Scirpus acutus*) and cattails (*Typha latifolia*), collectively known as "tules." Tules provide habitat for fish and birds, and provide water quality benefits by removing nitrogen and phosphorus from the water. However, widespread tule growth decreases diversity and other habitat values for wildlife. Also, when tules die, they add organic matter to the bottom sediments, which could potentially degrade water quality by increasing biological oxygen demand. Excessive tule growth also reduces channel capacity.

Ecosystem Sciences (Technical Memorandum No. 9) indicate that with time, shade from new riparian canopy trees and deeper water resulting from increased flow would hinder tule growth. Active tule removal will only be conducted in rare instances, and would probably only be considered where there are significant constrictions along the river or at culverts. Extensive removal or active management of tule stands to retard the expansion of tule growth or to increase open water habitat will not be considered unless funding for such work is obtained from sources other than LADWP or the County.

In the rare instances of active tule removal, they would be removed by mechanical means. A tracked excavator would work from adjacent dry banks or levees to remove tules (both above and below ground parts). Excavated material would be temporarily stockpiled in upland areas to dewater, then would be removed from the site. The excavator would typically create a 15- to 25- foot wide open channel, removing whole tule plants and roots from the channel bottom. Tules would not be removed or managed by controlled burns. To the extent possible, existing roads would be used to access tule removal sites. If new roads are needed, subsequent CEQA and NEPA review would be performed.

Saltcedar Management

Management of saltcedar and other noxious weeds are discussed in Section 10.4.

Riparian Vegetation Management

Riparian vegetation will be monitored along and adjacent to the river for the first 15 years to determine if the MOU goals for this vegetation are being achieved (see Section 2.10). If it is determined that the seasonal habitat flows are not achieving the riparian vegetation goals of the MOU, adjustments to the seasonal habitat flow releases may be considered as adaptive management measures. In addition, if before the 15th year after the implementation of the LORP, it is determined that the goals are not being achieved due to other reasons, other actions to promote the growth of such vegetation will be considered as an adaptive management measure. The implementation of any such measures will be subject to the funding limitations described in Section 2.2.2 and consistent with the MOU.

2.3.10 Land Management Along and Adjacent to the River

As part of the LORP, a land management plan to address livestock grazing along the river on Los Angeles-owned land within the LORP project area will be implemented. Six major individual leases and one small lease occur in the LORP planning area. The goal of the land management plan is to maintain upland and riparian habitats along the river, while allowing continued grazing uses on the leases. The primary management practices that will enhance riparian resources along the river and complement the releases to the river include adjusting the timing, distribution, and utilization rates of current grazing

practices, if necessary, around sensitive seeps/springs, selected riparian areas, and rare plant populations. In many instances, new fencing will facilitate these management actions. The land management plan is more fully described in Section 2.8.

2.3.11 Threatened and Endangered Species

Habitat suitable for Owens pupfish and Owens tui chub will be maintained and created in the river as a result of the LORP (Ecosystem Sciences, Technical Memorandum 14, 2001). However, as explained in Section 2.7, the project does not include any actions to create sanctuaries in the river for these species, nor does the project include any deliberate actions to introduce these species into the river. Any actions to introduce these species and/or to create sanctuaries for these species in the river would only occur under the provisions of an Endangered Species Act Section 10(a) permit and Habitat Conservation Plan ("HCP") approved by the U.S. Fish and Wildlife Service. An HCP and Section 10(a) permit are not proposed as part of the LORP. However, LADWP is planning to prepare an HCP for all LADWP lands in Owens Valley, and seek a Section 10(a) incidental take permit in the near future. Consultation with and approval from USFWS and CDFG will be required for the HCP.

2.4 DELTA HABITAT AREA, INCLUDING PUMP STATION

The MOU identified general boundaries of the Delta Habitat Area, and the area along the river where the pump station must be located, as shown on Figure 2-4. The boundary of the proposed Delta Habitat Area is shown on Figure 2-5. The Delta is dominated by a combination of alkali playa, alkali meadow, riparian scrub, riverine habitat, and transmontane alkali marsh. A description of the vegetation mapping in the Delta and changes in wetland acreages over time is provided in Section 6.1.3.

The Delta contains two major channels (see Figure 2-5), with numerous shallow braided channels and pools scattered throughout a flat alluvial fan, and varying in depth from about 6 feet to less than 1 inch. Flows from the river that top the channel banks spread across the Delta and create small, shallow (less than 6 inches deep) seasonal water bodies used by shorebirds and wading birds.

The MOU includes a pump station to be located between Keeler Bridge and the Lower Owens River Delta (Figure 2-4). The facility is intended to capture flows in the river and divert the water to the Owens Lake Dust Mitigation Program or to the Aqueduct for use by LADWP. The Aqueduct is located about 4 miles west of the pump station. Although the pump station will be located along the river itself, it is described in this section because of its ability to control the amount of flows released to the Delta Habitat Area. The pump station proposed under the LORP is described in Section 2.4.3.

Most of the Delta Habitat Area occurs on State-owned lands, managed by the State Lands Commission (SLC) (Figure 2-6). These lands are grazed by a single private party. The existing grazing operation on State lands within the Delta Habitat Area currently occurs without a land use agreement with SLC. State lands are not managed by LADWP or the County, and thus, there are no proposed LORP-related land disturbances on State lands, except for the installation of two temporary gaging stations. Additionally, monitoring is proposed within Delta lands under SLC jurisdiction. LADWP will obtain a land use approval from SLC prior to installation the gaging stations.

The small portion of the Delta Habitat Area that occurs on LADWP land is included in LADWP's 7,100-acre Delta Lease, which extends north of the Delta area. LADWP land included in the Delta Habitat Area consists of a narrow band about 1,500 feet wide along the upper 4,000 feet of the west branch of the river

(Figure 2-6). The total area of LADWP land in the Delta Habitat Area is 361 acres[1]. The proposed land management plan for the Delta Lease is described in Section 2.8.2.5.

2.4.1 Goals for the Delta Habitat Area

The enhancement of the Delta Habitat Area is described in the MOU as follows:

> *"The goal is 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 areas and ponds suitable for shorebirds, waterfowl and other animals within the Owens River Delta Habitat Area. Diverse natural habitats will be created and maintained through flow and land management, to the extent feasible, consistent with the needs of the 'habitat indicator species' for the Owens River Delta Habitat Area. These habitats will be as self-sustaining as possible."*

LADWP, as the CEQA lead agency, believes that by enhancing and maintaining the acreage of vegetated wetlands and water that existed in 1996 (645 acres; see Table 6-3 in Section 6.1.3) at the time of the approval of the MOU, LADWP will have met and exceeded the MOU goals of maintaining and enhancing 325 acres of existing Delta habitats. Notwithstanding this position, LADWP is in concurrence with Ecosystem Sciences' analysis, the proposed flow regime for the Delta Habitat Area will enhance and maintain the approximately 831 acres of water and vegetated wetland that existed in 2000 and the water and vegetated wetland within the Delta Habitat Area boundary existing at the time of the implementation of flows to the Delta under the LORP. The water and vegetated wetland within the Delta Habitat Area boundary existing at the time of the implementation of flows to the Delta under the LORP are hereafter referred to as the "Delta conditions." Delta conditions will be described both in terms of areal extent and quality as measured by Habitat Suitability Index (see Section 2.10.3). The vegetation types to be included in the definition of "Delta conditions" are: alkali marsh, wet alkali meadow, alkali meadow (on floodplain and lucustrine landtypes), Goodding-red willow, and water. The intermittently flooded playa (unvegetated) within the brine pool transition area will not be included in the definition of "Delta conditions." (See Table 6-2 and Section 6.1.3 for a description of these vegetation types.)

Prior to implementation of LORP (during the first growing season after the adoption of the Final EIR/EIS), the water and vegetated wetlands in the Delta Habitat Area will be mapped from aerial photographs (procedure described in Section 6.1.3.2). This map will serve as the description of the "Delta conditions." The aerial photographs that will be 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 exact date will vary from year to year depending on several factors including: weather conditions and resultant annual variation in the duration and timing of the growing season; events that affect visibility (e.g., fire); and the timing of other monitoring activities in the Owens Valley (e.g., aerial photographs needed for vegetation monitoring under the Inyo County/Los Angeles Long Term Water Agreement). Open water and shallow flooded areas will be reflected in the vegetation (e.g., wet alkali meadow versus alkali meadow).

The Delta ecosystem is dynamic, and the ratio of water to vegetated wetlands within the Delta Habitat Area will fluctuate seasonally and over time from the "Delta conditions." Maintenance of "Delta conditions" does not imply that exactly the same type of wetlands or their location must be maintained. New wetlands may be established and conversion of existing wetlands to different types of wetlands will occur. Shifting of open water habitats is also anticipated as vegetation changes exert control over Delta hydrologic processes. The proposed flow regime for the Delta is designed to maintain the acreages and

[1] Since the publication of the Draft EIR/EIS, the acreage of LADWP land in the Delta Habitat Area was recalculated based on more recent GIS data compiled by CH2MHILL, consultant to LADWP for the Owens Lake Dust Mitigation Program.

similar habitat quality of wetlands within the Delta habitat area occurring at the time of project implementation, recognizing the dynamic nature of Delta landforms and their plant communities.

LADWP proposes that if monitoring indicates that the MOU goals are not being met, or if the "Delta conditions" are not being maintained, adjustments of flows to the Delta Habitat Area within the 6 to 9 cfs annual average range specified in the MOU will be made to attempt to meet the MOU goals and to maintain the "Delta conditions". Also, 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.

The Delta is a dynamic system much like an alluvial fan. As a result, it is possible that a future uncontrolled high flow in the river caused by very high natural runoff in a high water year or a flash flood could result in a dramatic change in the habitat in the Delta. These events could change present landforms and drainage configurations, potentially drying or otherwise removing existing habitat or relocating habitat to another position in the Delta area. In such circumstances, the goals for the Delta and the "Delta conditions" described above might be temporarily disrupted. If this should occur, LADWP will implement appropriate adaptive management measures, examples of which are described in Section 2.10, Table 2-20. to restore or replace the lost habitat. After a catastrophic event, it could take many years before "Delta conditions" are restored.

As called for in the MOU and developed by Ecosystem Sciences, the restoration of the Delta Habitat Area will not initially include physical modifications within the Delta, such as modifying existing channels, creating new channels, constructing berms, or otherwise modifying the topography to increase water spreading or ponding in the Delta. Such a management scenario is described as an alternative to the project in Section 11, and will also be considered as part of adaptive management. Instead of such modifications, the proposed management approach relies on flow management, natural hydraulic and biological processes, and land management practices (on the portion of the Delta within the LADWP lease) to maintain and enhance wetlands. This is consistent with the approach adopted under the MOU.

The habitat indicator species listed in the MOU for the Delta are:

- Owens pupfish and Owens tui chub (state and federal endangered species)
- Resident, migratory, and wintering waterfowl
- Resident, migratory, and wintering wading birds
- Resident, migratory, and wintering shorebirds

Habitat suitable for Owens pupfish and Owens tui chub will be maintained and created in the Delta as a result of the LORP (Ecosystem Sciences, Addendum to Technical Memorandum 8, April 2000). However, as explained in Section 2.7, the project does not include any actions to create sanctuaries for these species in the project area, nor does the project include any deliberate actions to introduce these species into the project area. Any actions to introduce these species and/or to create sanctuaries for these species in the Delta or any other part of the LORP area would only occur under the provisions of an Endangered Species Act Section 10(a) permit and Habitat Conservation Plan ("HCP") approved by the U.S. Fish and Wildlife Service. An HCP and Section 10(a) permit are not proposed as part of the LORP. However, LADWP is planning to prepare an HCP for all LADWP lands in Owens Valley in cooperation with USFWS, and seek a Section 10(a) incidental take permit in the future.

2.4.2 Baseflows, Pulse Flows and Seasonal Habitat Flows

The MOU states:

> *"Subject to applicable court orders concerning the discharge of water onto the bed of Owens Lake, the quantity of water that will be released below the pumpback station for these purposes will be an annual average of approximately 6 to 9 cfs (not including water that is not captured by the station during periods of seasonal habitat flows). The portion of the Wildlife and Wetlands Management Plan element of the LORP Plan which addresses the Owens River Delta Habitat Area will, in view of the quantity of water to be released below the pumpback system, determine the amount of water needed to maintain existing habitats, to enhance existing habitats, and to create new habitats, and will determine the amount and use of seasonal habitat flows. The plan will evaluate the feasibility and the relative environmental benefits of the enhancement of existing habitat and the establishment of new habitats. Based upon this evaluation, the plan will recommend how existing habitats should be maintained, which existing habitats should be enhanced, what new habitats should be established, and how the water should be released and used so that these habitats are maintained in a healthy ecological condition."*

The management action for creating and enhancing habitats in the Delta is to establish baseflows to the Delta from the Lower Owens River with an average annual flow of 6 to 9 cfs, as specified in the MOU. Within the 6 to 9 cfs annual average flow, four pulse flows of 20 to 30 cfs will be released to the Delta for short periods of time to increase the distribution and amount of water in the Delta to benefit certain vegetation growth periods and shorebird activity, as described in Section 2.4.2.3. The daily baseflow would be the amount necessary to maintain "Delta conditions" and to conserve water for use in the Delta during other times of the year (within the 6 to 9 cfs annual average and a minimum of approximately 3 cfs at any time) and for delivery to Los Angeles. In addition, higher flows may pass through the pump station to the Delta during the annual seasonal habitat flows in the Lower Owens River (up to 200 cfs) and natural flood events and/or necessary Aqueduct releases (see Section 2.3.2).

To summarize, LADWP's proposed management actions for the Delta Habitat Area consist of three types of flow releases: (1) baseflows; (2) four pulse flows; and (3) bypass of annual seasonal habitat flows. The average of baseflows and pulse flows will be within the 6 to 9 cfs average annual flow allocation stipulated in the MOU. Seasonal habitat flows are not included in the 6 to 9 cfs annual average flow range.

2.4.2.1 Establishment of Baseflows (First Year)

Flow into the Delta (inflow) less flow out of the Delta (outflow) is a measure of the water stored and consumed, or that needed to sustain existing water and vegetated wetlands for those flow periods. The difference between inflow and outflow is an estimate of the total water demand (evaporation, transpiration, storage and infiltration) integrated over all existing vegetation types in the Delta Habitat Area. The Delta Habitat Area functions as a basin, which fills to capacity, then overflows to the brine pool. When the Delta Habitat Area is overflowing to the brine pool, it is a good indication that the evapotranspiration demands have been met and the storage capacity has been exceeded. Baseflow releases into the Delta will be established within the 6 to 9 cfs annual average specified in the MOU (with a minimum baseflow of approximately 3 cfs at any time), based on monitoring of outflow from the Delta during the first year of pump station operation. The goal of the baseflow releases will be to maintain the "Delta conditions" mapped during the first growing season after the adoption of the Final EIR/EIS..

Delta baseflows will be established during the first year following completion of the pump station. During the first year, LADWP will manage releases from the pump station to maintain an average daily

outflow of approximately 0.5 cfs from the vegetated portion of the Delta Habitat Area, as described in the bulleted items below. (An outflow of 0.5 cfs was selected since it is the smallest flow rate that can be measured reliably and can be used to confirm that water is overflowing from the Delta Habitat Area). The daily releases from the pump station to maintain the 0.5 cfs outflow during the first year will serve as the schedule of releases to be made in subsequent years. These releases may be modified as part of adaptive management if monitoring results indicate a reduction in habitat quantity and/or quality (see criteria described in Section 2.4.2.2).

- Following completion of pump station construction, an initial baseflow of 5.3 cfs will be released to the Delta Habitat Area. This initial baseflow was established based on an estimate of evapotranspiration demand of the vegetation (GBUAPCD, 1997). Temporary stream gages equipped with recording devices will be installed where the vegetation ends in the channel of the lower west branch and the lower east branch (Figure 2-5).
- Outflow will be recorded hourly and collected biweekly during the first year.
- If the total average daily outflow from the two gages for any 14-day monitoring period is less than approximately 0.5 cfs, baseflows for the subsequent 14-day monitoring period will be increased.
- If the total average daily outflow from the two gages for a 14-day monitoring period is greater than approximately 0.5 cfs, baseflows may be decreased for the subsequent monitoring period.

A record of baseflows needed to maintain approximately 0.5-cfs average daily outflow for 14-day monitoring periods will be compiled the first year after project implementation. This record will be used to calculate the amount of baseflows for each of the following periods: May 1 to September 30, October 1 to November 30, December 1 to February 28, and March 1 to April 30. Hence, seasonal baseflows will be established based on direct measurement of outflows during the first year following completion of pump station, which reflects assumed water demand for vegetation resources that exist in the first year . No pulse flows will be released to the Delta during the first year when the baseflow regime is being determined.

2.4.2.2 Adjustment of Baseflow (Subsequent Years)

Once the baseflows have been established, it is anticipated that the vegetation in the Delta will eventually consume all of the baseflow releases during the growing season and that outflow from the vegetated Delta wetlands may occur only during the four pulse flow periods and with minimal outflows during the cooler periods of the year when evapotranspiration is not occurring or minimal.

Once the seasonal baseflow releases have been established as described above, baseflow releases in subsequent years will be adjusted within the 6 to 9 cfs annual average range based upon the following monitoring triggers:

(1) A decrease of 10 percent 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 defined above) as estimated from aerial or satellite imagery or other appropriate methods (see also Section 2.10.1).
(2) A 20 percent or greater reduction in habitat suitability index (areal extent and habitat quality; see Section 2.10.3) as measured at 5-year intervals after the commencement of releases of baseflows to the Delta.
(3) A reduction in baseflows to the Delta will be considered if monitoring indicates: 1) an increase of 10 percent or more in area during any 3-year period from the "Delta conditions", and 2) an increase of 20 percent or more in habitat suitability index as measured at 5-year intervals.

2.4.2.3 Pulse Flows

Beginning in the second year of LORP implementation, four pulse flow periods will be released to enhance water distribution and habitat. Pulse flows will be applied for four periods as follows:

- Period 1: Flows of 25 cfs will be released for 10 days (496 acre-feet) 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 (Jim Paulus, GBUAPCD, personal communication). 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 (397 acre-feet) 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 (496 acre-feet) 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 (298 acre-feet) will be released to benefit wildlife and to recharge the freshwater lens.

The magnitudes and durations of these flows are summarized below in Table 2-11. The total amount of water allocated to pulse flows is 1,687 acre-feet per year. However, this amount may be modified since the amount, duration and timing of both baseflows and pulse flows may be adjusted (within the range of 6 to 9 cfs annual average) as part of adaptive management based upon the monitoring triggers described in Section 2.4.2.2.

TABLE 2-11
SUMMARY OF PROPOSED PULSE FLOWS TO THE DELTA*

Pulse Flow	Dates	Duration (days)	cfs/day	Ecological Purpose
Period 1	Mar-Apr	10	25	Early growth of saltgrass
Period 2	June-July	10	20	General wetland support
Period 3	Sept	10	25	Wetlands and early migrating birds
Period 4	Nov-Dec	5	30	Wintering birds
Total =		35		

* This table does not include seasonal habitat flows that could reach the Delta.

2.4.2.4 Seasonal Habitat Flows

In addition to the baseflows and pulse flows, higher flows may pass through the pump station to the Delta during the seasonal habitat flows in the Lower Owens River. The magnitudes of the seasonal habitat flows that will reach the Delta will depend on the amount of water released at the River Intake (which will vary each year based on forecasted runoff; see Section 2.3.5.3) and channel losses during these releases (evaporation, transpiration, and percolation). A detailed analysis of the amount of water that is

expected to reach the Delta from seasonal habitat flows is presented in Section 6.0. Seasonal habitat flows that bypass to the Delta are not included in the calculation of the 6 to 9 cfs annual average flow.

2.4.3 Pump Station and Associated Facilities

A pump station will be constructed in the MOU-designated area between Keeler Bridge and the Delta (Figure 2-4). The facility will capture a portion of the flows in the river and divert it to Owens Lake for use in the Dust Mitigation Program (see Section 12.3) or to the Aqueduct for use by LADWP. LADWP's first priority will be to deliver water as needed to the Dust Mitigation Program, and secondarily to the Aqueduct if flows are not needed for the Dust Mitigation Program. Water that is not captured will be bypassed to the Delta.

2.4.3.1 Location

The MOU requires that the pump station be located in a designated area downstream of Keeler Bridge (see Figure 2-4). The specific site was selected by Bureau of Reclamation (BOR) during their conceptual design study. It is located about 4.5 river miles south of Keeler Bridge. This location was chosen because of several key factors: (1) it is within the area specified by the MOU and is located on LADWP land; (2) it is located above the dune areas around the lake margins, thus avoiding areas where construction would be difficult; (3) the river channel at that location has a steep western bank, which provides ideal circumstances for keying the pump station into the western bank; and (4) the site has a natural backwater area which will be converted to a forebay for the pump station.

The pump station site is located in an 800- to 1,000-foot wide floodplain, with an active river channel on the west side of the floodplain that meanders and creates a small oxbow with a permanent pond (Figure 2-9). The floodplain is about 15 to 20 feet lower than the adjacent upland areas. There are steep bluffs along the western edge of the floodplain. The active channel is about 200-feet wide and 5-feet deep. Riparian and wetland vegetation is present in the channel bottom, which currently contains year-round flow.

2.4.3.2 Pump Station Design

The pump station will be located in a 229- by 189-foot facility yard (approximately 1 acre) that is placed below grade on the western bank of the river (Figure 2-11) with 3:1 (H:V) cut slopes, which together with the facility yard will encompass about 1.25 acres. The yard will be enclosed by a 7-foot high chain link fence. The pump station itself will be 60 by 60 feet with a nearby electrical transformer yard. The pump station will consist of the following main elements:

- A 28- by 46-foot buried sump with two openings and two chambers where the pumps will be immersed (Figure 2-12). The two individual openings to the sump will each be about 9 feet wide and 12 feet tall. A 20-foot wide by 42-foot long intake will be connected to the sump. The intake will contain bulkhead gates to close the intake for maintenance. In addition, each opening will contain a trash rake and a trash screen with ¼-inch openings (Figure 2-13). An open pad area will be provided for operation of the trash rake and the trash screen. The trash screen will be routinely cleared of floating debris. Water depth in the sump will vary from 8 to 12 feet. Both chambers would typically be used simultaneously, but one can be closed off for maintenance while the other side remains operational.

- Four pumps will be located in separate bays. Two bays at a time can be closed off with bulkhead gates for maintenance. The preliminary design concept is to have three duty pumps (two variable speed and one on/off) and one on/off standby pump (for maintenance), which will allow the

necessary degree of flexibility to manage flows to the Delta. Under this scenario, each pump will have a capacity of approximately 17.5 cfs. Depending on economic considerations, the successful contractor may elect to supply pumps with a slightly different capacity. Consequently, the exact capacity of the pumps will not be known until a contract for construction of the pump station has been awarded by LADWP. However, as required per the Stipulation and Order entered in Inyo County Superior Court Case Number S1CVCV01-29768 (Sierra Club and Owens Valley Committee v. City of Los Angeles et al., February 13, 2004), the maximum flow leaving the pump station will be 50 cfs as measured by the flow meter with a continuous recorder (see also Section 2.4.3.10 regarding pump station operation).

- A 60- by 60-foot prefabricated metal building that will enclose a control room and a pump room (Figures 2-11 and 2-13). The electrical control room will be equipped with heating and air conditioning units. The building will be about 32 feet tall.

- A 24-foot diameter spherical air chamber partially buried above the 36-inch diameter pipeline outside the facility yard (Figure 2-11).

- A 36-inch diameter buried discharge pipe will extend about 400 feet to a connection with the existing 60-inch diameter pipeline to the Dust Mitigation Program, which also connects to the Aqueduct (Figures 2-7 and 2-7A).

- A service area with gravel surfacing for parking and equipment maintenance will be incorporated within the main facility yard (Figure 2-11).

- Lighting at the pump station will be designed to minimize impacts on nighttime viewscape and wildlife. The wattage and number of lights will be minimized to the extent feasible while ensuring employee safety and security. Most lighting will be full cutoff, shielded, and downward pointing. An exception will be the lighting for the trash rack, which will be directed towards the water for cleaning and maintenance of the trash rack. All lighting will be normally off, unless necessary nighttime maintenance is being performed. Lighting at the doorway to the pump station will be equipped with a motion sensor (with manual overrides), and the remainder of the lights will be operated with a manual switch. Height of free standing light posts will be less than 20 feet. Light spill or glare beyond the facility yard footprint will be minimized to the extent possible using the above measures (exceptions include the lighting for the trash rack). Lighting during nighttime construction, if any, will be minimized and directed towards the immediate work areas; however, the safety of construction personnel will be the first priority.

Note: The description of the pump station design and dimensions provided above reflect detailed design, and has been modified from the description in the Draft EIR/EIS, which reflected preliminary design.

2.4.3.3 Diversion Structure

A diversion structure will be constructed across the river channel consisting of the following individual elements: 40-foot wide spillway, 30-foot wide spillway weir plate, bypass/flushing gate, 150-foot long spillway abutment, and 650-foot long erosion control structure (Figures 2-7 and 2-8). The spillway will consist of a 6-foot high rock-filled embankment with a 25-foot deep sheet pile cutoff wall, and the spillway weir plate will be a concrete structure (Figure 2-8). The top of the rock-armored spillway will be at elevation 3,589.5 feet, and the spillway weir plate will be at elevation 3,589.00 feet. The elevation of the river channel invert at the upstream base of the diversion will be 3,583.5 feet. A 185- by 270-foot sediment basin will be maintained upstream of the diversion with an invert elevation of 3,579 feet (Figure

2-7). The spillway width and depth will be sufficient to pass a discharge of 1,400 cfs, which is the largest observed flow between 1945 and 2001. The upstream and downstream faces of the rock-filled spillway will have 36-inch diameter ungrouted riprap rock on sand.

The diversion structure will include a 10-foot wide, 100-cfs gate for controlled releases to the Delta Habitat Area and to flush out sediments from behind the diversion, which will be used during seasonal habitat flows or as needed to flush sediment.

A 150-foot long spillway abutment will be constructed east of the spillway, extending across the active channel (Figure 2-8). It will protect the spillway from being washed out during flood flows. The diversion structure will be constructed of compacted on-site material. It will have a 25-foot deep sheet pile cutoff wall for the westerly 50 feet and a 10-foot deep sheet pile cutoff wall for the remaining length. The spillway abutment will have a 10-foot wide top, and rock riprap on the upstream slope. The crest of the spillway will be about 40 feet wide. The top elevation of the structure will be 3,594 feet, about 4 feet higher than the spillway. It is estimated that flows of 150 cfs over the spillway will have an elevation of 3,590.3 feet. During significant flood flows, the water body behind the diversion will increase in elevation as controlled flows pass over the spillway up to elevation 3,590.5 feet. Above that elevation, river flows will also begin to pass around the east end of the spillway abutment, over the erosion control structure (elevation 3,590.5 feet) described below.

An erosion control structure (an earthen berm 650 feet in length and up to 2 feet in height) will be constructed at the east end of the spillway abutment (Figures 2-7 and 2-8). It will consist of a sheet pile cut-off wall with a minor berm constructed to elevation 3,590.5 feet. The berm and sheet pile will be designed to contain flows in minor channels meandering through the floodplain (outside the main channel) during the seasonal habitat flows (up to 200 cfs). The structure will mostly be below grade, except where it will cross several of these small channels. At these locations, the structure will be about 1 to 2 feet in height. The aboveground portions of the sheet pile cut-off wall at these locations will be buried under an unarmored earthen berm. Flows higher than 200 cfs will pass over the erosion control structure, eventually joining the main channel downstream of the diversion.

During construction of the permanent diversion structure, a 2- to 3-foot high temporary earthen berm will be constructed to divert flow from the river and around the diversion site. Construction of the berms will require clearing a 100-foot wide corridor across the river, and temporarily constructing an earthen berm across the river channel (using riverbed materials) that diverts flows to a bypass culvert or open channel on the east side of the river (Figure 2-7). The berm and bypass culvert or channel will be removed after construction is completed. The riverbed will be re-graded to pre-construction conditions, and flows would be returned to the river.

2.4.3.4 Forebay

A flooded area, or "forebay," will be created in the river channel upstream of the diversion structure. Under the 40-cfs baseflow conditions, the forebay would be about 17 acres in extent (see Figure 2-14).

2.4.3.5 Service Roads

A 2,200-foot long, 16-foot wide gravel service road (West Service Road) will be constructed between the existing access road to the Dust Mitigation Program and the sediment basin in the forebay (Figure 2-9). This road will be used by heavy equipment to access the sediment basin. It will be constructed on a fill slope. The base of the fill will have an average width of about 45 feet. Approximately 6,000 cubic yards of fill material will be required for this road.

A 400-foot long, 16-foot wide gravel access road (South Service Road) will be constructed from the existing dust control road to the pump station (Figure 2-9). The existing grade will be excavated as the road slopes down to the pump station.

A 600-foot long, 16-foot wide gravel service road (East Service Road) will be constructed on the east side of the river to allow inspection of the diversion structure and sediment pond (Figure 2-9). The road will connect to an existing dirt road. It will be constructed on a fill slope with a base of about 45 feet. Approximately 2,000 cubic yards of fill material will be required for this road.

2.4.3.6 Road Surfacing

As part of this project, approximately 3,200 feet of an existing roadway to the pump station site will be surfaced with an aggregate base. This road was constructed in conjunction with and as part of the Phase 1 dust mitigation project for Owens Lake. Since the surfacing of this road will be confined to the limits of the existing roadway there will be no impact to vegetation in the area. It is anticipated that approximately 1,000 cubic yards of aggregate base will be placed 6 inches deep and 16 feet wide over the surface of the 3,200-foot segment of the road. The material required for surfacing will be acquired from existing sand and gravel mining operations approved under the Surface Mining and Reclamation Act (SMARA). It is estimated that, at maximum, it will require two road graders, two water trucks, two compactors and 10 dump trucks to complete this portion of the project. This work will be performed during the first 2 months of pump station construction.

2.4.3.7 Sediment Management

A 185- by 270-foot, 4-foot deep sediment basin will be constructed and maintained in the forebay about 200 feet upstream of the diversion with an invert elevation of approximately 3,579 feet (Figures 2-7 and 2-9). The total capacity of the sediment basin will be about 7,400 cubic yards. Maintenance dredging will occur on an as-needed basis. It is anticipated that maintenance dredging will occur at least every other year. Sediments will most likely be removed by a wheeled excavator, or by a crane with a clamshell bucket. Sediments will be placed in two upland locations (approximately 1.8 acres) for dewatering (Figures 2-9 and 5-2) over several weeks. The dried sediments will then be spread along the top of the west bluff well above the river in a barren sandy area, up to a height of 6 feet with a potential footprint of 100 by 150 feet (3,000 cubic yards). Additional sediments that accumulate over time will be transported to appropriate off-site areas. If significant floatables collect in the forebay, a boom will be installed across the pond and floating debris will be removed as needed using a boat.

2.4.3.8 New Power Line

The new power requirements for the pump station can be met with the existing generating capacity within the LADWP's Owens Valley electrical generation system, which includes the Cottonwood Power Plant. Specific power requirements for the pump station include: four 600-hp pumps, a minimum of five butterfly valves (5 hp each), two 1-hp bulkhead gates, and one approximately 40-hp air chamber compressor.

Power will be conveyed to the pump station along a combination of a new power line from the Cottonwood Power Plant (located about 10 miles southwest of the pump station along Highway 395; Figure 2-10) and a new conductor on an existing line, as described below. The new, 7-mile long single conductor power line will be constructed between LADWP's Cottonwood Power Plant substation west of Owens Lake to a tie-in point on an existing line (Figure 2-10). The new line would be located 12 feet east of an existing single-conductor, wooden pole line for the first 6 miles, spanning Highway 395 at its northern end. The final mile of the new line would be located 60 feet west of the Owens Gorge

Transmission line with large steel lattice towers. The new line traverses lands owned by LADWP and the Bureau of Land Management. The new power line will consist of single wooden poles placed approximately 250 feet apart, and the conductor will be placed approximately 43 to 48 feet above the ground surface (approximately 5 to 10 feet higher than the existing line). The new power line will employ vertical construction with conductors spaced at least 4 feet apart in vertical distance to prevent raptors or other large birds from touching both conductors simultaneously and becoming electrocuted. The distance between the existing and new power lines (approximately 12 feet or more) will also be sufficient to prevent electrocution. In addition, the vertical construction does not have a crossbar, which minimizes the potential for large birds to perch on the pole. Each pole has a diameter of approximately 7 to 8 inches at the top and 15 to 18 inches at the base.

The proposed power line would tie-in to an existing east-west wooden pole line that conveys power to the Dust Mitigation Program on the north lake (Figure 2-10). This line was installed in 2000 and is located about 500 feet north of the older existing power line to Keeler. A new conductor would be installed on the recently constructed wooden poles for a distance of about 2.5 miles. Power for the pump station would be delivered to a small substation located about 30 feet from the pump station.

Construction of the new power line and installation of a new conductor would require about 6 months. Construction and maintenance access would be provided by the existing dirt road along the existing nearby power line. The new poles would be installed using an auger truck accessing the pole locations by overland travel from the nearest dirt road. No new dirt roads would be constructed along the new power line. A daily crew of five to eight people would typically be involved in the installation of a new power line, with four to five trucks along the construction corridor.

2.4.3.9 Construction

Construction would occur over a 12-month period. It will involve the following major phases (some of which will be conducted simultaneously):

1. Prepare Site; Road Surfacing – Build temporary diversion and bypass pipeline or open channel, then divert flows around the construction site; remove vegetation from alignment of the diversion; install temporary cofferdams around the pump station site and dewater; install service roads to sediment basin and east side of river; place, grade, and compact aggregate base on existing access road;. This phase would require about 2 months. The temporary diversion and bypass pipe are shown on Figure 2-7.

2. Install Diversion Structure – Construct the spillway, spillway abutment, bypass/flushing gate, and erosion control structure; excavate sediment basin. This phase would require about 3 months.

3. Construct Pump Station Structure – Install foundations, concrete sump, structural backfill, and piping. This phase would require about 5 months, of which 2 would overlap with the above activities.

4. Install Pumps, Mechanical, Electrical, Controls, and Pipeline – Install pumps, electrical, and mechanical equipment; install air chamber and electrical transformer yard; install fencing; site clean up; remove temporary river diversion and bypass; install 36-inch diameter pipeline to the Dust Mitigation Program pipeline; test system. This phase would require about 5 months, 1 of which would overlap with the above activities. Once this phase in completed, Phase 2 releases to achieve the 40-cfs baseflows in the river would begin.

Construction activities would occur within the 24-acre construction area shown on Figures 2-7 and 5-2. About 15,000 cubic yards would be excavated from the banks above the river to create a flat pad for the pump station facility yard (Figure 2-11). The site would be over-excavated and backfilled with an engineered foundation. About 1,250 cubic yards of the excavated material would be used to construct the entire diversion and erosion control structure. The remainder would be spread out on the top of the riverbank west of the pump station in a barren sandy area. About 1,800 cubic yards of rock will be imported from off-site sources, and about 1,250 cubic yards of concrete will be required for the pump station facility.

An estimated 9,000 cubic yards would need to be removed during the construction of the sediment basin (Figure 2-7). The material will be disposed on the adjacent riverbanks. Rock will be imported for the spillway and for armoring the abutments. Gravel will be imported to build the access road to the sediment basin, and the service road on the east side of the river. Estimated total quantities of imported construction materials are listed below in Table 2-12. Imported materials will be obtained from existing borrow pits.

TABLE 2-12
ESTIMATED CONSTRUCTION QUANTITIES

Task or Project Facility	Material	Estimated Imported Material
Diversion structure	Rock and sand	1,800 cubic yards
Diversion structure	Sheetpile	700 linear feet
Pump station	Concrete	1,250 cubic yards
Facility yard and roads	Gravel	8,000 cubic yards

The primary construction access would be provided from Highway 395 and the existing dirt road that extends from Boulder Creek Resort to the river. This road is the major access road to LADWP's North Lake Dust Mitigation Program. Access would also be provided from Keeler Road to the east side of the river during the construction of the diversion structure. An estimate of the average number of workers, employee vehicles, and trucks is provided in Table 2-13.

TABLE 2-13
ESTIMATED CONSTRUCTION DURATION AND WORKFORCE

Phase	Approximate Duration (months)	Average Daily Number of Workers	Average Daily Number of Worker Vehicles
1. Prepare site	2	6	5
2. Install diversion structure	3	10	8
3. Construct pump station structure	5 total, 3 net (2 overlap with above phase)	12	10
4. Install pumps, controls, mechanical, and electrical	5 total, 4 net (one overlaps with above phase)	8	7
Total duration =	12 months		

2.4.3.10 Pump Station Operation

The pump station will be unmanned and operated under local automated control at the facility. Operations will be remotely monitored and controlled by LADWP from Keeler. The facility will be inspected routinely by LADWP personnel to clean the trash rack, ensure proper functioning of all

mechanical equipment, and to secure the facility. The pump station will have several lights mounted on 20-foot poles at the South Service Road gate, air chamber enclosure and pump station facility yard. These lights will be manually controlled and will only be used during nighttime inspections.

The diversion structure will contain a 10-foot wide bypass/flushing gate (Figure 2-8). The gate will measure the bypass flow. The invert of the gate will match the channel bottom next to the diversion (about 3,583.5 feet). Flows will pass over the gate on a continuous basis. The gate is designed to pass up to 30 cfs. The gate will be used to bypass to the Delta the baseflows, the four pulse flows of up to 30 cfs, and a portion of the seasonal habitat flows. The remainder of seasonal habitat flows will pass over the spillway. Flows that are not bypassed will be pumped from the river.

The pumps would operate automatically based on the water level in the forebay. When water levels rise because bypass flows and pumping are less than river inflows, the pumps will be energized in sequence. The converse will occur as water levels drop. As required per the Stipulation and Order entered in Inyo County Superior Court Case Number S1CVCV01-29768 (Sierra Club and Owens Valley Committee v. City of Los Angeles et al., February 13, 2004), the maximum flow leaving the pump station will be 50 cfs as measured by a flow meter with a continuous recorder.

Under typical operating conditions when flows in the river at the diversion are about 40 cfs, the forebay would have an operating water elevation of 3,588.5 feet, established by the combination of river inflows, bypass flows and pumping. Under these conditions, the depth of water at the upstream base of the diversion would be about 5 feet, while the depth of water in the sediment basin about 200 feet upstream would be about 9 to 10 feet. The impoundment under these conditions would extend upstream for about 3,000 feet, and create a water body with a surface area of about 17 acres (Figure 2-14). The daily water level fluctuation is expected to be about 1 foot.

When river inflows exceed pumping capacity plus bypass flows, the ponded water surface would rise and water would spill over the spillway weir plate at 3,589.0 feet. The pump station will divert up to 50 cfs of seasonal habitat flows, and the remainder of the flows will pass over the bypass/flushing gate. If flood flows of greater than 200 cfs occur, the flows will pass over the bypass/flushing gate and the spillway and around the east end of the diversion structure over the erosion control structure.

Most of the flows recovered at the pump station will be diverted to the lake Dust Mitigation Program. At present, the water for the Dust Mitigation Program is being supplied from the Aqueduct through the 60-inch diameter pipeline, which extends from the Aqueduct to the northern portion of the lake, where it is conveyed to several spreading areas through distribution lines (Figure 2-7A). Water recovered by the pump station will be discharged into the 36-inch diameter pipe and conveyed to the existing 60-inch pipeline.

Water will only be pumped to the Aqueduct when recovered flows exceed Dust Mitigation Program demands. No valve will be installed to direct the flows – they will follow a pressure gradient, first to the lake, then to the Aqueduct.

2.5 BLACKROCK WATERFOWL HABITAT AREA

2.5.1 Background

The Blackrock Waterfowl Habitat Area consists of four separate management units: Drew, Waggoner, Winterton, and Thibaut (Figure 2-15). The total area within which flooding could potentially occur within the four units is approximately 1,342 acres. Under the MOU, LADWP is required to flood 500

acres out of the 1,342 acres, except in years when runoff is forecasted to be less than average. In addition, the areas within 300 feet of the flooded areas, called "adjacent zones," are expected to benefit from the flooding and to provide important nesting, resting, and feeding habitat for waterfowl and many other wildlife species that use the Blackrock area. The total area of these adjacent zones in the four Blackrock management units is 1,241 acres (Figure 2-15). Thus, the Blackrock Waterfowl Habitat Area consists of a total of 2,583 acres within four management units.

Table 2-14 shows the approximate extent of the maximum area of potential flooding for each of the four management units in the Blackrock area and for the areas adjacent to the flooded areas, which are expected to be influenced by the flooding.

TABLE 2-14
MAXIMUM AREA OF POTENTIAL FLOODING AND ADJACENT HABITAT ZONES

Management Unit	Potential Flooded Area (acres)	Adjacent Habitat Area (acres)	Total Management Unit Area (acres)
Drew	246	151	397
Waggoner	327	271	598
Winterton	281	244	525
Thibaut	488	575	1,063
Total =	1,342	1,241	2,583

Source: Ecosystem Sciences.

Portions of the management units currently include waterfowl habitat in various man-made lakes and seasonally flooded pastures. Over the past 40 years, the Blackrock area has been used for water spreading in high runoff years, grazing, and other activities. For example, when runoff has exceeded the Aqueduct capacity, water has been spread over extensive areas normally used for dry grazing that extend from Blackrock Ditch to Billy Lake. To facilitate spreading, LADWP has constructed miles of dikes, levees, ditches, roads, culverts, and basins. The water spreading basins are connected by ditches, culverts, and spillgates. Significant areas were recontoured in the past to facilitate spreading and percolation and to reduce the need to release water to Owens Lake, which was limited by a court injunction.

Much of the existing wetland vegetation in the Blackrock area was created and is maintained by these water releases. Natural wetlands are present in the area at seeps and springs along the 1872 earthquake fault line. Existing wetlands in the Blackrock Waterfowl Habitat Area include open water areas, emergent wetlands (cattail and bulrush marsh), rush/sedge meadow, and alkali meadow. The Blackrock area is currently grazed by livestock in various LADWP leases, as described in Section 2.8. Due to historical land and water management practices, the vegetation communities in the Blackrock area have been significantly altered.

2.5.2 Goals for the Blackrock Waterfowl Habitat Area

The MOU provides that the overall management goal for the Blackrock Waterfowl Habitat Area is to: *"... maintain the existing habitat in order to provide opportunities for the establishment of resident and migratory waterfowl populations, and to provide habitat for other native species. Diverse natural habitats will be created and maintained through flow and land management, to the extent feasible, consistent with the needs of the 'habitat indicator species' for the Blackrock Waterfowl Habitat Area. These habitats will be as self-sustaining as possible."*

The habitat indicator species listed in the MOU for the Blackrock Waterfowl Habitat Area are:

Native fish:
- Owens pupfish (state and federal endangered species)
- Owens tui chub (state and federal endangered species)

Native birds:
- Northern harrier
- Least bittern
- Rails
- Marsh wren
- Resident, migratory, and wintering waterfowl
- Resident, migratory, and wintering wading birds
- Resident, migratory, and wintering shorebirds

The MOU also states that *"Approximately 500 acres of the habitat area will be flooded at any given time in a year when the runoff to the Owens River watershed is forecasted to be average or above average. In years when the runoff is forecasted to be* less *than average, the water supply will be reduced in general proportion to the forecasted runoff in the watershed."*

As described in the following sections, under the LORP an annual average of 500 acres will be flooded in the Blackrock Waterfowl Habitat Area in average or above average runoff years, subject to seasonal water level fluctuations.

2.5.3 Overall Management Strategy

Specific project objectives for the Blackrock Waterfowl Habitat Area include the following: (1) provide a reliable and dependable source of water and wetland habitat that will attract resident and migratory waterfowl and shorebirds, and the other MOU indicator species for this project element; (2) maintain the ratio of open water wetlands to emergent wetlands so that emergent wetlands do not exceed about 50 percent of the flooded area of any management unit; and (3) create and maintain diverse habitats while minimizing the use, extent, and frequency of intervention and manipulation.

During average and above average runoff years, approximately 500 acres would be flooded in one or more management units on an annual average basis (subject to seasonal fluctuations). In below average runoff years, less than 500 acres may be flooded; the exact amount would be determined by the Standing Committee each year in accordance with the MOU. The flooded wetlands in the different units would be in stages of development (wet phase) or in stages of decline (dry phase).

As part of project implementation, LADWP will establish a system of gaging stations in the four Blackrock management units, which will serve as indicators of the area of flooding in each of the units. To document compliance with the MOU's requirements for this project element, LADWP and the County will monitor water levels at the gaging stations and flows at spillgates and diversions that supply the units. The information will be reported to agency managers so that releases can be adjusted to ensure compliance with the MOU.

The project proposes flooding portions of the Blackrock Waterfowl Habitat Area to increase wetland productivity and diversity, which is consistent with the approach described in the LORP Plan. The management units would be subject to periodic cycles of wetting and drying so that one to three management units would be wholly or partially flooded at any given time. This phase of the management is considered "wet" or "active." Management units not actively managed or flooded are considered "dry" or "dormant." The purpose of the dry phase is to control excessive cattail and bulrush growth, which

reduces the value of the wetlands to the MOU indicator species for the Blackrock area. In practice, depending on the quality of habitat provided by each of the management units (e.g., the extent of emergent vegetation that develops in a given unit), some units could remain flooded indefinitely, while others could be left dormant, as long as the MOU requirements are met.

Units will be converted from a wet to a dry phase when the area of emergent vegetation in an active unit reaches 50 percent of the flooded area. LADWP and the County will track the extent of emergent vegetation within the active units using remote sensing imagery, or other appropriate tools, and the estimates of flooded areas calculated from the gaging stations measurements.

Water will be conveyed through the Blackrock Waterfowl Habitat Area through a series of existing channels (Figure 2-15). The water supplied to the area from the Aqueduct will be independent of the releases to the river. Very little water will leave the Blackrock Waterfowl Area and return to the river. Therefore, water losses to the Blackrock Area will be primarily consumptive losses. Various physical improvements will be necessary to facilitate water movement, including replacement or repair of small spillgates, and reshaping of old ditches. These improvements are described in Section 2.5.10 for each management unit. An overview of the areas subject to flooding under the proposed plan is provided on Figure 2-15.

LADWP and the County may also use controlled burns as a tool to manage vegetation in the Blackrock Waterfowl Habitat Area to maintain desired ratios of open water and emergent vegetation. Controlled burns may be used on a limited basis and only if necessary. Effective water management may reduce the need to use this management tool.

The proposed water management for the Blackrock Waterfowl Habitat Area will not be conducive to promoting suitable habitat for Owens pupfish and Owens tui chub. The project does not include any actions to create sanctuaries in the Blackrock area for these species, nor does the project include any deliberate actions to introduce these species into the area. If suitable habitat were created in this area, any actions to introduce these species in the Blackrock area would only occur under the provisions of a Section 10(a) permit and Habitat Conservation Plan ("HCP") approved by the U.S. Fish and Wildlife Service. An HCP and Section 10(a) permit are not proposed as part of the LORP. However, LADWP is planning to prepare an HCP for all LADWP lands in Owens Valley in cooperation with USFWS, and may seek a Section 10(a) incidental take permit in the near future.

2.5.4 Proposed Flooding Regime

The Blackrock Waterfowl Habitat Area will be implemented in two flooding cycles that will occur during the first 10 to 15 years of the project. At this time, it is intended that the two cycles would be repeated, unless it is determined through adaptive management that the goals of the MOU would be better achieved by modifying the flooding regime. In addition, water releases to the active Blackrock management units will be controlled to induce seasonal fluctuations in water levels.

Cycle 1

1. Existing water releases to the Waggoner Unit will be discontinued and the unit will begin a dry phase to remove the emergent vegetation in this unit. During cycle 1, the open water and vegetated wetland habitat in the Waggoner Unit will be reduced from 268 acres (including areas of open water and vegetated wetland in the "adjacent habitat" area, see Table 7-1) to 0 (Table 7-3, cycle 1). Controlled burning may be used if needed to reduce the amount of standing dead cattails and bulrushes.
2. Approximately 354 acres will be flooded in the Thibaut Unit.

3. Approximately 165 acres of the Winterton Unit will be flooded to achieve 500 acres of flooded area.

Cycle 2

When the flooded area of the Winterton Unit develops 50 percent cover of emergent vegetation, cycle 2 will be implemented:

1. Flooding will be discontinued or reduced in the Winterton Unit. The unit is expected to revert to the existing 76 acres of open water and vegetated wetland within the area that will be flooded during cycle 1.
2. Depending on conditions in the Thibaut and Winterton units, between 100 and 150 acres (estimated at 147 acres in Tables 7-2 and 7-3, cycle 2) will be flooded in the Waggoner Unit to achieve 500 acres of flooded area.
3. The Thibaut Unit will continue to be flooded at 354 acres, unless the area of emergent vegetation reaches 50 percent of the flooded area, at which time the unit would be shifted to a dry phase and flooded areas in one or more of the other three units would be increased to meet the MOU requirement.

The Drew Unit will not be flooded at any time, unless it is needed to create additional flooded areas to achieve the 500-acre MOU requirement or to better meet MOU habitat goals amongst the four management units.

It should be noted that, when a unit is placed in a dry cycle, the water supply will be discontinued and the flooded area in that unit will remain for some time thereafter, slowly disappearing over time. At the same time, the unit transitioning into a wet cycle will receive water to start the flooding process. Thus, during the transitional period, a substantial amount of acreage over 500 acres will be flooded. In addition, as the water level recedes in a drying unit, the same benefits will occur in the unit as will be provided during the seasonal fluctuations in water levels in active management units described below.

Seasonal Water Level Fluctuations

The extent of the flooded areas in all of the management units will fluctuate with the water supply and on a seasonal basis. Seasonal water level fluctuations are an important attribute of managed wetlands. Water level changes provide substrate for aquatic invertebrates and macrophytes, both of which are essential food resources for many migrant and resident waterbirds, especially brooding young.

The MOU states "approximately 500 acres of the habitat area will be flooded at any given time in a year when the runoff to the Owens River watershed is forecasted to be average or above average." In less than average runoff years, the water supply to the Blackrock area may be reduced in general proportion to the forecasted runoff and will be set by the Standing Committee. LADWP plans to meet the above goal for the Blackrock habitat area by maintaining an average annual flooded acreage of approximately 500 acres during average or above average years, and by maintaining on an annual average basis the acreage set by the Standing Committee for years that have less than average runoff. Within the annual average, the total area flooded at any time during a runoff year will vary seasonally as described below.

Seasonal fluctuations are expected to occur in active management units between winter and summer seasons, as evaporation and plant transpiration rates vary with changing temperatures. For example, in the winter, transpiration and evaporation rates are low and minimal fluctuations in water levels are anticipated, given a constant water supply. In the summer, as temperatures rise, evaporation and transpiration rates increase, which results in higher demands on the applied water. If the water supply is

not increased to meet these greater demands, the flooded area will shrink. The resulting seasonal fluctuations will create wetlands around the perimeter of the flooded area that serve as productive feeding areas for the Blackrock area indicator species. Flooded acreage would not be reduced below 450 acres or exceed 550 acres in average and above average runoff years (unless runoff exceeds Aqueduct capacity). The fluctuations will not displace wildlife and will add to the habitat diversity available to the indicator species by promoting establishment of a variety of wetland vegetation types.

Beginning April 1 of each year, up to 550 acres will be flooded in the Blackrock area. Once the area has been flooded, water releases will be held steady and water levels will be allowed to recede as summer evaporation and plant transpiration increases. As a result, flooded acreage will be temporarily reduced to less than 500 acres (but no less than 450 acres at any one time). If the flooded area approaches 450 acres, water supplies will be increased, and over the course of each runoff year, water supplies to the Blackrock area will be managed to achieve an annual average of no less than 500 acres of flooding in average and above average runoff years.

2.5.5 Water Management by Runoff Year

The management strategies for different types of runoff years are summarized below:

Forecasted Average to Above Average Runoff Year (100 Percent or More of the Average Annual Runoff)

The MOU requires that approximately 500 acres of habitat be flooded at any given time under these runoff conditions. This acreage requirement would be met through flooding operations in one or more of the four management units at any one time to achieve an annual average of approximately 500 acres in average and above average runoff years (see above). The area of the existing off-river lakes and ponds, which are included in the "Off River Lakes and Ponds" feature of the LORP (see Section 2.6), is not included in the calculation of flooded acreage in the Blackrock area.

Forecasted Below Average Runoff Year (50 to 99 Percent of Average Annual runoff)

The MOU states that water for the Blackrock Waterfowl Habitat Area will be reduced in general proportion to the reduction in the forecasted runoff. The amount of acreage to be flooded in years when the runoff is forecasted to be less than average will be set by the Standing Committee based on recommendations in the LORP Plan and in consultation with the CDFG. Under these conditions, the duration of the dry phase of a management unit then in a dry phase would be extended, and water supply to units then in a wet phase would be reduced. Hence, there would not be a rapid and substantial change in water conditions in these years. Instead, there would be small incremental changes in the amount of water in the area, reflecting the general reduction in runoff throughout the valley.

2.5.6 Anticipated Wetlands Creation

Most of the created and enhanced flooded wetlands will be managed as semi-permanent wetlands that are flooded for several years then dried to remove emergent vegetation. When full, these waterbodies would have depths ranging from a few inches to several feet. These wetlands will primarily consist of seasonal ponded water and cattail/bulrush marsh. The lands adjacent to the flooded areas will be hydrologically influenced by the flooding.

During the first year of the active phase, the newly flooded areas would consist of mostly open water. Over time, emergent wetland plants would colonize the margins of the newly flooded areas until emergent wetlands (i.e., cattail and bulrush marsh) would occur throughout much of the flooded areas. As the

water is removed from these areas for a dry cycle, other wetland plants and annuals would colonize the newly exposed substrate. These areas are expected to develop into a mosaic of wet meadows, emergent vegetation, mesic meadows, and seasonally flooded areas. The degree of influence that flooding will have on these areas will depend on soil types and water holding capacities of adjacent area soils. The higher plant growth and vegetative density in these adjacent areas will provide high quality habitat for nesting waterfowl.

During the course of the flooding and drying cycles, wetlands and flooded areas will increase in some management units and decrease in others compared to current conditions. With the exception of the Waggoner Unit (which is currently flooded), during the wet cycle, when water is being supplied for flooding, the acreage of open water and vegetated wetlands in a management unit would be greater than under current conditions. The increased water supply will result in the conversion of uplands to wetlands and from drier wetlands to wetter types. New vegetated wetlands will be established within and adjacent to the flooded areas. During dry cycles when water is removed from a unit, the amount of vegetated wetlands would be reduced compared to current conditions.

2.5.7 Land Management and Saltcedar Control

The Blackrock Waterfowl Habitat Area includes portions of the Blackrock, Thibaut, and Intake livestock grazing leases. Management plans for these leases are described in Section 2.8. The plans include various measures to ensure that grazing practices will be compatible with the proposed management of the Blackrock Waterfowl Habitat Area. These measures include appropriate utilization rates, improved monitoring of utilization, fencing to create new pastures, and improved distribution of stock watering sites.

There is potential for increasing the distribution or vigor of existing saltcedar stands in the Blackrock Waterfowl Habitat Area due to periodic flooding and drying of management units. Saltcedar colonizes disturbed areas, soils with high salt concentrations, burned areas, and newly exposed wetland or mudflat areas. The potential for the growth of saltcedar and other noxious plants and control of such noxious plants are discussed in Section 10.4.

2.5.8 Schedule

The improvements to the water management facilities (described below) will be initiated as soon as the EIR/EIS for the project is approved and any necessary permits are obtained. LADWP anticipates it will take 6 months to complete the improvements. Flooding would be initiated once improvements are finished.

2.5.9 Water Use

LADWP currently supplies water to the Blackrock Waterfowl Habitat Area management units and adjacent lands for various purposes, including pasture irrigation, livestock watering (from ditches), and wetland habitat. The existing and future average annual water supplies to the Blackrock area are summarized in Table 2-15. Very little, if any, of the water supplied to the Blackrock Waterfowl Habitat Area would reach the Lower Owens River.

TABLE 2-15
EXISTING AND FUTURE WATER REQUIREMENTS
IN THE BLACKROCK WATERFOWL HABITAT AREA

Management Unit	Point of Delivery	Existing Average Annual Water Use (acre-feet per year)*	Long-term Estimated Future Annual Water Use (acre-feet per year) in Normal Runoff Years** when the Unit is Active
Drew	Drew Slough Diversion	0	0
Thibaut	Thibaut Diversion (East and South gates); Winterton Diversion	499	1,750
Waggoner	Waggoner Diversion; Twin Lakes Diversion***	0	750 (total water use for Waggoner and Winterton Units)
Winterton	Winterton Diversion	404	
Total =			2,500

*Does not include periods when water is released to the Blackrock area for Aqueduct maintenance or operations.
**Water use for future wetlands based on water demand of 5 acre-feet per acre per year, using the flooded acreage under Cycles 1 and 2: 350 acres in Thibaut Unit and 150 acres in Waggoner and Winterton units.
*** Existing water demand does not show water consumed in Waggoner area from diversions to supply Goose Lake.

2.5.10 Physical Improvements

Various physical improvements will be necessary to manage water conveyance and flooding in the management units to achieve the objectives for these units. The structural improvements to be implemented in each of the four management units are described below, and are summarized in Table 2-16.

TABLE 2-16
SUMMARY OF PHYSICAL IMPROVEMENTS AT
BLACKROCK WATERFOWL HABITAT AREA

Management Unit	No. of New or Replaced Spillgates or Culverts	Miles of New or Repaired Berms	Miles of New or Repaired Ditches
Drew	2	1.4	0
Thibaut	0	0.7	0
Winterton	1	0.2	0.4
Waggoner	4	1	1.3
Total =	7	3.3	1.7

The replacement of spillgates would involve minor earth and structural work. Spillgates are constructed of wood and steel, with concrete footings and/or walls. Construction work would only require about one week and only require truck mounted equipment and crane, a backhoe, small front loader, material trucks, and employee vehicles.

Raising and repairing existing berms would require the use of a front-end loader or bulldozer. A scraper is not expected to be necessary. Most of the existing berms are only 10 to 30 feet wide. Large earthmoving equipment would not be necessary to re-contour and raise the berms. All berm repair would use on-site borrow material taken from the sides of the berms.

New berms and ditches would also be constructed using small earthmoving equipment and on-site material. Any new berms and ditches would be constructed similarly to existing facilities. Construction of new berms and ditches is expected to require about 6 months.

2.5.10.1 Waggoner Management Unit

Management Objectives. This unit is located west of Lower Twin Lake, Coyote/Grass Lakes Complex, and northwest of Goose Lake (Figure 2-15). It receives water from the Blackrock Ditch at the Waggoner Diversion. At present, water is released from the Waggoner Diversion to support Goose Lake. The Waggoner management unit currently has water year-round. Water released from the Waggoner Diversion moves through various wetlands, through culvert No. 98 and under bridge No 97, then into the Coyote/Grass Lakes Complex and Goose Lake.

This unit has the greatest topographic diversity of the four management units, which provides an opportunity to create greater habitat diversity, including deepwater wetlands. Primary long-term objectives include: (1) increase the extent of open water in wet cycles; (2) increase shallow water brooding habitat; (3) improve the water conveyance facilities; (4) separate the water management infrastructures supporting this unit and the off-river lakes and ponds; and (5) increase nesting opportunities. The existing management practices for Lower Twin, Coyote/Grass Lakes Complex, and Goose Lake (totaling 169 acres) would remain unchanged. Under these practices, water is supplied year-round to these lakes to maintain a game fishery (see Section 2.6).

Structural Improvements. Portions of a mile-long stretch of berms and levees (i.e., berms with roads on top) would be raised 1 to 3 feet. The existing culvert (No. 105) at the south end of Lower Twin Lakes would be replaced (Figure 2-15). An earthen ditch would extend from this culvert across a man-made basin to a new culvert (No. 101), and then along a second branch of the ditch to an existing culvert (No. 99). Water would pass from culvert 101 into lower Waggoner wetlands, providing a second option for filling these wetlands, which are currently supplied water by the Waggoner Diversion. Water from existing culvert No. 99 would be conveyed through a new ditch across a second basin to an existing culvert (No. 100) that would be used to supply water to the Coyote/Grass Lakes Complex and Goose Lake. The length of the new ditch from culvert No. 105 to culvert No. 100 is about 1.3 miles. This ditch would allow water from the Lower Twin Lakes Diversion to supply the Coyote/Grass Lakes Complex and Goose Lake, which have been supplied to date from the Waggoner Diversion. Spillgate No. 98 and bridge No. 97, which convey water from the Waggoner wetlands to the Coyote/Grass Lakes Complex and Goose Lake, would be replaced.

2.5.10.2 Winterton Management Unit

Management Objectives. This unit contains a large man-made basin with scattered upland islands. The latter would become prime waterfowl nesting and brooding areas because they provide cover and protection from predators. Water is supplied to this unit from the Winterton Diversion on Blackrock Ditch.

Structural Improvements. A new spillgate (no number assigned) would be constructed at the south end of the wetlands to contain water within the unit (Figure 2-15). Several sections of existing berms (totaling about 0.2 linear miles) would need to be raised 1 to 3 feet. In addition, a new ditch about 0.4 miles in length would be constructed at the southern end of the wetlands.

2.5.10.3 Thibaut Management Unit

Management Objectives. In most years, this unit will receive water from the Thibaut Spillgate, which branches into the East Spillgate (serving the western and northern portions of the unit) and the South Spillgate (serving the southern and southeastern portions of the unit). In extremely wet years, it will receive water from the Thibaut Spillgate and possibly the Winterton Diversion. This unit contains the most natural wetlands in the Blackrock Waterfowl Habitat Area, and supports a wide diversity of wetland types. Because topographic relief in this unit is low, deep-water wetlands are not present. However, extensive wetlands can be maintained in the unit with less water than would be required at the other management units. The Thibaut East Spillgate would primarily be used to flood this unit. Water from this spillgate moves east to the Thibaut Ponds, then south through a series of ponds and mudflats (Figure 2-15). Water would also be supplied to a lesser degree from the Thibaut South Spillgate. The primary management objectives for this unit are to create shallow wetland for shorebirds, dabbling ducks, and geese.

Structural Improvements. The gaging facilities on the East and South Spillgates would be replaced. Approximately 0.7 miles of berms would be raised about one foot at seven locations in the unit (Figure 2-15). Grazing improvements would be implemented, including new fenced pastures and new gates, as described in Section 2.8.

2.5.10.4 Drew Management Unit

Management Objectives. This unit is relatively flat and is located adjacent to the Blackrock Ditch, which would facilitate water management (Figure 2-15). Water would be supplied to this unit from the Blackrock Ditch through the Drew Slough Spillgate. Currently, no water is supplied to this unit, and no water releases are planned for the unit under the LORP unless needed to meet the MOU requirement to flood 500 acres, or to meet the MOU habitat goals. If it is flooded in the future, the unit will be best suited for shallow seasonal wetland habitat for shorebird foraging (fall, winter, spring), and year-round wading bird use.

Structural Improvements. The existing dilapidated Drew Slough Spillgate would be replaced, requiring the installation of two new culverts (Figure 2-15). The Drew Slough Return gate, which appears to have been destroyed, would be re-established. About 1.4 miles of the existing dike between the unit and Blackrock ditch (on the north side of the ditch) would be elevated by several feet to prevent flooded areas from spilling into the ditch (Figure 2-15).

2.6 OFF-RIVER LAKES AND PONDS

2.6.1 Background

In the mid 1980s, LADWP and the County implemented the Lower Owens River Rewatering Enhancement/Mitigation Project. As part of this project a permanent water supply was provided to Twin Lakes (Upper and Lower), Goose Lake, Billy Lake, and Thibaut Ponds. A permanent water supply to these surface water features will be continued as part of the LORP.

2.6.2 Goals

The goals of this physical feature, as stated in the MOU, are to "*…maintain and/or establish these off-river lakes and ponds to sustain diverse habitat for fisheries, waterfowl, shorebirds and other animals … through flow and land management, to the extent feasible, consistent with the needs of the "habitat*

indicator species" for the off-river lakes and ponds." The off-river lakes and ponds included in the LORP are Twin Lakes (Upper and Lower), Goose Lake, Billy Lake, and Thibaut Ponds. The habitat indicator species listed in the MOU are:

Non-native game fish:
Largemouth bass
Smallmouth bass
Blue gill
Channel catfish

Native fish:
Owens pupfish (state and federal endangered species)
Owens tui chub (state and federal endangered species)

Native birds:
Northern harrier
Least bittern
Rails
Marsh wren
Osprey
Resident, migratory, and wintering waterfowl
Resident, migratory, and wintering wading birds

2.6.3 Management Approach

To achieve the goals for off-river lakes and ponds for non-native game fish, LADWP will maintain the existing water supplies to, and water levels in, the following lakes: Upper and Lower Twin Lakes, Goose Lake, Thibaut Ponds, and Billy Lake (Figure 2-1b). Under the proposed project, the management of these off-river lakes and ponds will not change from existing practices. The management objectives for the off-river lakes and ponds are as follows:

- Upper and Lower Twin Lakes: Existing staff gages will be maintained between 1.5 and 3.0, which represents maintenance of existing conditions.
- Goose Lake: Goose Lake must be kept full in order to spill over and provide a continuous flow to the river. Therefore, Goose Lake will always be full. Typical staff gage readings reflecting Goose Lake at full capacity are between 1.5 and 3.0.
- Billy Lake: Billy Lake will remain full in order to maintain a continuous spill to the river. A staff gage was never placed in Billy Lake because it has always been operated at a spillover level.
- Thibaut Ponds: One or more gaging stations will be installed to monitor pond levels. The Thibaut Ponds area delineated on Figure 2-15 will be kept full.

Habitat suitable for Owens pupfish and Owens tui chub will be created in the off-river lakes as a part of the LORP (Ecosystem Sciences, Technical Memorandum 8, 2001). However, the project does not include any actions to create sanctuaries in the lakes for these species, nor does the project include any deliberate actions to introduce these species into the lakes. Any actions to introduce these species to off-river lakes and ponds would only occur under the provisions of a Section 10(a) permit and Habitat Conservation Plan ("HCP") approved by the U.S. Fish and Wildlife Service. An HCP and Section 10(a) permit are not proposed as part of the LORP. However, LADWP is planning to prepare an HCP for all LADWP lands in Owens Valley in cooperation with USFWS, and seek a Section 10(a) incidental take permit in the near future.

The LORP does not include any active management of cattails and bulrushes at the off-river lakes and ponds.

2.6.4 Water Supply

The Blackrock Spillgate conveys water from the Aqueduct to the Blackrock Ditch, which in turn, provides water to maintain Upper and Lower Twin Lakes, Coyote/Grass Lakes Complex, and Goose Lake (Figure 2-1b). These flows are also diverted for water spreading, livestock water, and off-river lakes at the following diversion gates (listed in west to east sequence): Lacey Diversion, Winterton Diversion, Four Corners Diversion, Drew Slough Diversion (currently inactive), Waggoner Diversion, Lower Twin Lakes Diversion, and Upper Twin Lakes Diversion.

Water is currently provided to Coyote/Grass Lakes Complex and Goose Lake through the Waggoner Diversion. Under the proposed project, water to supply Coyote/Grass Lakes Complex and Goose Lake will be provided from the Lower Twin Lakes Diversion instead of the Waggoner Diversion when the Waggoner Unit is in the dry cycle. Under current conditions and when the Waggoner Unit is in the wet cycle, water is supplied to Coyote/Grass Lakes Complex and Goose Lake from the Waggoner Diversion off of the Blackrock ditch (Figure 2-1b). Water released from the Waggoner Diversion moves through various wetlands and into the Coyote/Grass Lakes Complex, and Goose Lake. These flows pass through an existing steel pipe culvert (No. 98) and under a wooden bridge (No. 97) at the southern end of the Waggoner wetlands (Figures 2-1b and 2-15).

From 1991 to 1997, an average of 1,956 acre-feet per year was released through the Waggoner Diversion to supply the existing Waggoner wetlands, Coyote/Grass Lakes Complex and Goose Lake. It is estimated that about 1,213 acre-ft/year is consumed in the existing Waggoner wetlands. The remainder (743 acre-feet per year) is used in the Coyote/Grass Lakes Complex and Goose Lake.

Under the LORP, water to supply these lakes will be provided from either the Lower Twin Lakes Diversion or the Waggoner Diversion, depending on the flooding status of the Waggoner unit of the Blackrock Waterfowl Habitat Area (Figure 2-1b). This change will separate the water management of off-river lakes and ponds (see Section 8.0) from water management designed for wetlands in the Blackrock area (see Section 7.0). The alternating use of these diversions will provide greater flexibility for ecosystem management and significant water conservation (totaling 1,084 acre-feet per year, which results in a savings of 872 acre-feet per year). The amount of water supplied to the lakes currently supported by the Waggoner Diversion (Lower Twin Lake - 53 acres in size, Coyote/Grass Lakes - 53 acres, and Goose Lake - 63 acres) would remain the same as existing conditions.

The structural changes required to accomplish the proposed modification in the source of supply for Goose Lake is described in Section 2.5.10.1. To create a continuous flow between these off-river lakes and the river, 5 cfs or more will be directed through the Lower Twin Lakes Diversion into Lower Twin Lake (Ecosystem Sciences, Technical Memorandum 14, 2001). These flows will continue along existing ditches to the Coyote/ Grass Lake Complex, through Goose Lake, and then to the river at "5 Culverts." The total linear distance of this new flow from the Lower Twin Lake Diversion to the river is about 5.3 miles. Per Technical Memorandum 14 (April 2001), a continuous flow will be maintained between Goose Lake and the river to allow unimpeded passage for fish between the lakes and river.

Billy Lake is supported by water conveyed from the Aqueduct through the Independence Spillgate and existing ditch that extends from the spillgate to the lake. Under the proposed program for off-river lakes and ponds, the level of Billy Lake will be maintained at its current level, but the amount of water supplied to the lake may be reduced because it will no longer be the main water supply conveyance to the river

channel. A continuous flow will be maintained in the channel downstream of the lake that will connect the lake to the river.

Thibaut Ponds are supported by water from the Aqueduct through the East Branch of the Thibaut Spillgate. No increase in water supply to this pond is included in the LORP.
LADWP estimates the current and future water requirements to maintain the lakes and ponds to be 5,320 acre-feet per year, as described in Section 10.4.

2.7 THREATENED AND ENDANGERED SPECIES

2.7.1 Overview

The MOU contains a section describing the preparation of land management plans, which states that the plans will consider "*the enhancement of Threatened and Endangered Species habitats. Habitat conservation plans for Threatened and Endangered Species will be incorporated if and where appropriate.*" The Action Plan describes the scope of the habitat conservation plan for threatened and endangered species as follows: "*The plan will identify conservation areas within the Planning Area which will be managed to facilitate restoration of threatened and endangered species to viable populations. The intent of this element is ultimately to achieve sufficient recovery of these species to warrant delisting them, while providing for the continuation of sustainable uses, including recreation, agriculture, and aqueduct operations*."

Threatened and endangered (T&E) species are considered in the LORP Plan. The actions recommended in the plan would protect and enhance habitat for these species in the LORP project area. However, the proposed project does not include any actions to create sanctuaries for these species, nor does the project include any deliberate actions to introduce, manage, or enhance populations of these species, with the exception of one action at Well 368 (see Section 2.7.2). Instead, the various elements of the LORP will improve or create habitats suitable for these and other species, and will protect individual populations of listed plant species in grazing areas. These actions are expected to generally benefit listed species. Furthermore, implementation of the project will not cause any adverse impacts to listed species nor to other species in the LORP area.

Although the MOU specifies that a Habitat Conservation Plan (HCP) will be prepared as one part of the LORP Plan, LADWP has concluded, after conferring with MOU parties, to delay initiating the development of an HCP until the project proposal and environmental documentation (EIR/EIS and associated documents) are finalized. The reason for delaying the HCP is that the MOU parties agreed that developing and finalizing a formal HCP would be time-consuming and could further delay implementation of the project if the HCP is tied to the project. In addition, some members of the public expressed concern over the possibility that endangered species could be introduced to popular fishing spots, and resolving those concerns could potentially add to the delay in implementing the LORP. LADWP feels that initiating the LORP implementation will provide an opportunity to better understand what is needed in the project to protect special status species. Furthermore, LADWP prefers to address all of its lands as a whole in an HCP, rather than focusing on the boundaries of the LORP. Thus, while the LORP contains provisions to develop habitat that is suitable for threatened and endangered species, there are no plans at this time to introduce those species to the LORP area.

Any actions to introduce T&E species to the LORP project area would only occur under the provisions of a Section 10(a) permit and Habitat Conservation Plan ("HCP") approved by the U.S. Fish and Wildlife Service. An HCP and Section 10(a) permit are not proposed as part of the LORP. However, LADWP is

planning to prepare an HCP for all LADWP lands in Owens Valley in cooperation with USFWS, and to seek a Section 10(a) incidental take permit in the near future.

In 1999, USFWS prepared a Multi-Species Recovery Plan (MSRP) for a variety of listed species in the Owens Valley. They identified potential habitat "sanctuaries" and conservation areas throughout the Owens Valley and within the LORP. The LORP conservation plan for T&E species is designed to provide future habitat opportunities for listed species, and would complement the approach in the MSRP.

2.7.2 Fish and Aquatic Species

There are two listed fish species considered in the LORP, both of which are designated endangered by the state and federal governments: Owens pupfish and Owens tui chub. The only known occurrence of these species in the LORP project area is the area near Well 368 in the Blackrock lease, which supports a population of Owens pupfish. In the past, protective fencing was installed around the area where the pupfish population was originally located. However, as the local vegetation and hydrologic conditions of the area near Well 368 changed through natural processes over time, the pupfish population migrated to a location outside of the fenced area. Based on a field visit to this site conducted in May 2003, CDFG and USFWS concluded that this pupfish population and its habitat are doing well without fencing and that modifications are not needed (S. Parmenter, CDFG, and D. Threelof, USFWS, pers. comm., 2003). Therefore, LADWP does not propose any management action with regard to the existing pupfish population.

The rewatering of the river and the enhancement of off-river channels and lakes are designed to create a variety of habitats that would benefit both game and native species, including the pupfish, tui chub, and speckled dace. However, predation and competition with game fish species may limit the success of any attempts to reintroduce these sensitive species in the river.

The Owens Valley Springsnail is a CDFG Species of Special Concern. There are eight known locations of springsnails in the Owens Valley, none of which occur in the LORP project area (USFWS, 1998).

2.7.3 Wildlife Species

Two state or federally listed threatened and endangered wildlife species occur in the LORP area, as described below. The endangered Least Bell's Vireo is apparently extirpated from the Owens Valley, and as such, is not included in the LORP plan.

Yellow-billed Cuckoo

This state listed endangered species is a rare transient and summer resident and breeder in limited areas of the Owens Valley. It occurs in dense, tall willow/cottonwood woodland. Since records have been kept, sightings have been recorded near Lone Pine, Big Pine, Independence, Aberdeen Station Road, and Tinemaha Reservoir.

Willow Flycatcher and Southwestern Willow Flycatcher

The willow flycatcher (*Empidonax traillii*) is a state endangered species. The southwestern willow flycatcher (*Empidonax traillii* ssp. *extimus*) is a federally endangered subspecies of the willow flycatcher. The state listed species occurs in the Owens Valley as a rare spring and fall migrant, summer resident, and/or possible spring/summer breeder. Both subspecies occur in dense willow thickets near water. Sightings of the flycatcher in and near the LORP area in the past 10 years include between Big Pine and Baker Creek, Owens River between Steward Lane and Tinemaha Reservoir, and the Owens River

between Bishop and Pleasant Valley Reservoir. Only the latter sighting included documented breeding birds, but it is located outside the LORP project area.

The southwestern willow flycatcher occurred historically in the Owens Valley; its historic northern limit represented by specimens from Independence (Riparian Bird Conservation Plan 2000). Recent genetic studies of willow flycatchers captured near Bishop identified the samples as the *extimus* subspecies (M.K. Sogge, pers. comm.). The draft southwestern willow flycatcher Recovery Plan prepared by USFWS indicates that there are 16 known territories of southwestern willow flycatcher in the "Owens Management Unit," which extends from Crowley Lake to south of Owens Lake (Draft Recovery Plan Southwestern Willow Flycatcher, April 2001, prepared by Southwestern Willow Flycatcher Recovery Team Technical Subgroup for Region 2, USFWS, Albuquerque, New Mexico).

American peregrine falcon

The American peregrine falcon (*Falco peregrinus anatum*) is a state endangered species. [The following information has been compiled from Ecosystem Sciences Technical Memorandum 20 (1999) and CDFG (2004).] Adult peregrines are slate gray above and light below, and the dark cap of the head extends to the cheeks. The wingspan exceeds 3 feet. The range includes most of California, except in deserts, during migrations and in winter. The California breeding range includes the Channel Islands, coast of southern and central California, inland north coastal mountains, Klamath and Cascade ranges, and the Sierra Nevada.

Peregrine falcons usually nest on cliffs exceeding 100 feet in height. The territories are principally located in open areas near water. The primary prey of inland peregrines is medium-sized birds, which are captured in the air. Wintering peregrine falcons utilize coastal and inland marsh and riparian areas. Wintering peregrine falcons are found inland throughout state, primarily near wetlands.

In the Owens Valley, the American peregrine falcon is a rare migrant from mid-March to Mid-November. There are no documented nesting records for this falcon in the Owens Valley. Only one adult peregrine was observed on one occasion during the Glass Mountain breeding bird census (in the Long Valley area). Between 1988 and 1992, 22 peregrine falcons were released on LADWP lands at Crowley Lake as part of an interagency cooperative project. Presently, there are no peregrines breeding at Crowley Lake, although nesting at Hilton Peak was recorded in about 1990. The current status of the released birds is unknown.

Peregrine falcon nesting habitat does not exist in the LORP area. The closest potential nesting habitat is at least 5 miles away. Much of the LORP area could be considered potential foraging habitat. Peregrine falcons are known to travel through and/or use the project area for foraging.

Proposed LORP Protection Measures

Based on Ecosystem Sciences' recommendations, LADWP proposes to protect T&E wildlife species in the LORP by: (1) avoiding direct adverse impact to these species during the construction and implementation of the LORP elements; and (2) maintaining and creating suitable habitat for these species. No special habitat restoration projects or efforts will be implemented for these species, although habitats produced by the LORP will likely be suitable for colonization by these species.

2.7.4 Plant Species

The Owens Valley checkerbloom is a state endangered species endemic to the Owens Valley. Scattered populations occur on Thibaut and Blackrock grazing leases east of the Owens River. It occurs in alkali meadows. Under the management plans for the Thibaut, Blackrock, and Delta leases, existing

populations will be protected by rare plant exclosures or by appropriate management strategies (see Section 2.8.1.2). Grazing will be prohibited in all exclosures during the flowering, fruiting, and seeding period of the species (from April to July). No federally listed plant species occur in the LORP project area.

2.8 LAND MANAGEMENT

2.8.1 Background

As required by the MOU Action Plan, the LORP land management plan covers Los Angeles-owned land within the LORP area from the Aqueduct Intake to the Owens River Delta, as well as all LADWP lands east of the Aqueduct to the boundary with BLM lands at the base of the Inyo Mountains.

Six major leases and one small lease occur in the LORP planning area (Figure 2-16). Acreages of individual leases are shown below in Table 2-17. Five leases (Twin Lakes, Blackrock, Island, Lone Pine, and Delta) are cow/calf grazing operations, and two leases (Thibaut and Intake) are grazed by horses/mules.

TABLE 2-17
LEASES INCLUDED IN THE LORP LAND MANAGEMENT PLAN

Lease	Current Total Lease Acreage
Twin Lakes	4,912
Blackrock	32,674
Thibaut	5,259
Island	18,970
Lone Pine	8,274
Delta	7,110
Intake	284

For each of the seven leases, an individual grazing management plan has been developed by Ecosystem Sciences and LADWP in cooperation with each leaseholder. The methodology used to prepare the grazing management plans included interviewing the lessees on their past livestock grazing practices (number and type of livestock, pasture uses and rotations, etc.). Some of the information obtained during the interviews and documented in the grazing management plans is proprietary, as it relates to marketing strategies and other business management plans of the individual lessees. Lessees agreed to provide the proprietary information to Ecosystem Sciences and LADWP with the understanding that the information would remain confidential. Therefore, the lease-specific grazing management plans are not available for public review (additional information on this confidentiality of these plans was provided, A. Walsh, pers. comm. to L.A. Silver, April 25, 2003). The information contained in Sections 2.8 and 9 of the EIR/EIS was excerpted from the LORP Plan (Chapter 4, "Land Management Plan"), which is a public document available for review.

2.8.1.1 Goals of the LORP Land Management Plan

The LORP land management plan is designed to achieve the MOU goal of continuing and managing livestock grazing and recreational use in a manner that is sustainable and consistent with the primary goal of establishing and maintaining a healthy ecosystem. (Management of recreational uses is discussed in Sections 2.9 and 10.1.)

LADWP also identified the following additional goals for the land management plan of the LORP:

- Maintain and improve aquatic resources
- Improve water use efficiency
- Improve animal distribution
- Work with lessees to develop and implement grazing management practices
- Successfully apply the adaptive management approach to maintain and enhance healthy watersheds
- Maintain compatibility with water gathering activities and cost effective aqueduct operations
- Enhance fisheries and wildlife habitat

2.8.1.2 General Land Management Approaches

Currently, LADWP leases within the LORP area do not have formal protocols for quantitative monitoring and evaluation of rangeland conditions and grazing strategies. The proposed actions described below will modify grazing practices on LADWP leases within the LORP area and establish quantitative monitoring of rangeland conditions to complement the habitat enhancements anticipated with the re-watering of the river. Grazing practices under the land management plan will differ from the past in timing of use, intensity, and animal distribution. However, at least initially, the stocking rate (i.e., number of animals) will remain the same as in past years, except for the Thibaut Lease (see Section 2.8.2.3).

General management actions and strategies include the following (lease-specific actions are described in Sections 2.8.2.1 through 2.8.2.7):

- Establishment of fenced riparian pastures
- Establishment of lease-specific utilization rates and grazing periods
- Establishment of rare plant exclosures
- Improvement of water distribution and stockwater supplies
- Protection of continued recreational access to the river
- Accommodation of elk passage

The lessees are expected to incorporate the changes in management called for in the grazing management plans over a period of 1 to 3 years from the time the plans are signed. The lessees are expected to meet all standards, criteria, and conditions outlined in the plans by the beginning of the fourth year.

Establishment of Fenced Riparian Pastures. Currently, riparian and upland areas within each lease are generally not separated by fencing or other physical barriers. As part of the LORP land management plan, a total of approximately 40 miles of new fencing will be installed primarily on the western side of the river to create fenced riparian pastures. Lease-specific locations of fences are shown on Figures 2-18 through 2-23. Creation of fenced riparian pastures will allow lessees to rotate livestock between riparian and upland areas and optimize the distribution of livestock within each lease. Grazing in riparian and upland pastures will be managed based on prescribed grazing periods and utilization rates described below.

Establishment of Lease-Specific Utilization Rates and Grazing Periods. Under LORP, lease-specific utilization rates will be established and monitored in both riparian and upland areas to guide grazing

strategies. Utilization rate is defined as the proportion of current year's forage production that is consumed and/or destroyed by grazing animals, including livestock, wildlife (e.g., elk), and insects. Utilization rates will be measured by establishing utilization cages and comparing the amount of vegetation biomass outside (grazed) and inside (not grazed) the cages. (See Section 2.8.1.5 for additional details on monitoring of utilization rates.) Utilization rates will be used to monitor and manage the use of vegetation, prevent forage overuse, and maintain the ecosystem health of rangelands.

As part of the LORP adaptive management approach, the initial allowable maximum riparian and upland utilization rates and grazing periods described below may be increased or decreased on a case-by-case basis depending on the changes in rangeland conditions as indicated by monitoring of rangeland "trend" (see also Section 2.8.1.5 below).

Riparian Utilization Rates and Grazing Periods. Under LORP, livestock will be 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). Livestock will be removed from riparian pastures when the utilization rate reaches 40 percent or at the end of the grazing period, whichever comes first. In general, the prescribed grazing periods for riparian pastures will be several months in the spring (shorter than the existing grazing practice). The beginning and ending dates of the lease-specific grazing period will vary from year to year depending on the conditions such as climate, but the duration will remain approximately the same. The grazing periods and utilization rates are designed to facilitate the recruitment and establishment of riparian shrubs and trees. Forty percent has been selected by the Ecosystem Sciences rangeland management specialist as the initial utilization rate, since livestock are not likely to graze woody species if herbaceous forage utilization stays below 40 percent.

Upland Utilization Rates and Grazing Periods. In upland pastures, the maximum utilization allowed on herbaceous vegetation, in any year, will be 65 percent if grazing occurs between October 1 and April 1. The maximum utilization allowed will be 50 percent if the grazing occurs between April 2 and September 30; however, if all grazing is deferred until after seed-ripe of herbaceous vegetation (i.e., late summer; exact timing depends on precipitation, weather, and other factors), maximum utilization can be increased to 65 percent. If this exception is used, then no additional grazing can occur during any other period of the year on this same upland. If the lessee conducts livestock grazing during both periods (October 1 to April 1 and again from April 2 to September 30), maximum utilization allowed will only be 50 percent. The utilization rates and grazing periods for upland pastures are designed to sustain livestock grazing and productive wildlife through efficient use of forage. If there are upland vegetation types located within fenced riparian pastures, the upland vegetation will be managed using the uplands utilization criteria.

Establishment of Rare Plant Exclosures. New rare plant exclosures will be constructed on Blackrock Lease (see Section 2.8.2.2) and Thibaut Lease (see Section 2.8.2.3) for populations of Owens Valley checkerbloom and Inyo County star-tulip. In addition, an existing rare plant exclosure for Nevada oryctes located on the Twin Lakes lease will be reconstructed (see Section 2.8.2.1). Monitoring will be conducted at trend plots established in the rare plant populations. The trend plots will be circular areas that are 0.01 acre in size, with a permanent stake at the center. Data on recruitment, persistence, size of individuals and flowering and seed presence will be collected at these trend plots. Additional fencing may be installed around other rare plant populations or sensitive seeps/springs (Figure 2-16A) as part of adaptive management (see Section 2.8.1.5) if monitoring indicates that livestock grazing is substantially impacting resource values as indicated by excessive trampling, reduction in riparian vegetation, and/or reduction in overall site health.

If noxious weeds are found during monitoring of the rare plants, the survey crew will notify LADWP and appropriate treatment will be administered jointly by staff with expertise in identifying rare plants and

staff qualified for noxious weed treatment. Noxious weed treatment in the vicinity of rare plants will be conducted using a weed wipe (equipment designed to apply herbicides only to plants that come into contact with the applicator) or by hand, as necessary, to prevent any adverse effects of herbicide application on the rare plants. This is LADWP's existing practice for treatment of noxious weeds in the vicinity of rare plants that will be continued under LORP.

Improvement of Water Distribution and Stockwater Supplies. To improve livestock distribution outside the river corridor or within riparian pastures, water gaps will be provided at periodic locations along the river. Water gaps are fenced access points to the river where cattle can use the river for watering, but are restricted to small locations in order to reduce impacts. In addition, new water troughs or stockwater wells will be strategically placed to encourage cattle to use areas outside the river corridor as needed. Salt and supplements will also be used to improve animal distribution.

Protection of Continued Recreational Access to the River. New fences installed for grazing management will maintain existing access to the river for recreationists. In some cases, the type of access may be modified (e.g., from vehicle to foot). Fences will be located on the outside edge of the access roads when possible to maintain access to the river. Cattle guards will be placed on roads that traverse fence lines when needed. "Walk-throughs" (Figure 2-16B) or "walk-overs" (Figure 2-16C) will be provided in heavy foot-traffic areas. Permanent fences across the river will be designed to avoid interference with boats or other watercraft (fence wings; see Figure 2-16D). Fence wings are rails that are attached to the ends of the fence and project over the edges of the banks. They will be used in locations where the channel is deep enough to prevent livestock from walking around the fence ends. The deep open area between the fence wings will allow for watercraft passage. A channel fence section (Figure 2-16E) will be used temporarily (approximately up to 3 months per year) in locations where livestock can enter the stream and walk around the fence ends. Navigation would likely be accommodated by kayaking or canoeing under the channel fence section. Channel fence sections will have smooth and flexible wires at the bottom and reflective strips to make them visible and safe for boaters when they are in place. Once the locations have been determined, this information will be posted on LORP signage. Channel fence sections will be removed when livestock are not present in the nearby pasture.

Accommodation of Elk/Deer Passage. Special fencing will be constructed at known elk/deer trails to allow safe passage and to reduce fence damage from elk/deer-crossing activities. Figure 2-17 shows a typical fence designed to accommodate elk/deer passage.

2.8.1.3 Alterations Due to Unforeseen Circumstances

In many cases, ranchers who lease LADWP lands also lease federal and other private lands for livestock grazing. If an emergency situation on a lessee's federal allotment(s) or on the lessee's deeded private lands results in serious reductions in allowable livestock numbers, Animal Unit Months (AUMs) or duration and timing of grazing, then temporary (one year or less) changes in grazing periods for upland areas within the LADWP lease may be made to help provide the necessary grazing relief to the lessee. Examples of circumstances that may allow changes in upland grazing periods are fire damage, forage loss from high snow years, and forage loss from drought conditions. During the attempt by LADWP to help provide some necessary grazing relief to the lessee, all riparian and upland utilization rates and grazing periods in the riparian areas as stated in the grazing management plans will remain in effect.

2.8.1.4 Land Management Monitoring and Adaptive Management

Monitoring for land management will consist of grazing utilization and trend measurements. The methodologies for monitoring utilization and trend are described below. To collect data on baseline conditions, a rangeland trend monitoring program was initiated in 2002 on all leases within the LORP

area using the methodologies described below. Minimally, the first two years of rangeland trend monitoring will be considered baseline. In portions of the leases that overlap with the riverine-riparian area, the Blackrock Habitat Area, or the Delta Habitat Area, additional monitoring for biological resources will be conducted as part of the overall LORP monitoring program as described in Section 2.10.

Unlike the other LORP monitoring and adaptive management activities described in Section 2.10, LADWP will be solely responsible for funding and for monitoring lease conditions on its leases located wholly or partially within the LORP area. LADWP will report the results of monitoring on these leases, as they apply to achieving LORP goals, as part of the annual report presented to the Technical Group.

The results of utilization and trend monitoring, together with relevant results of other LORP monitoring programs, will be used to determine the need for adaptive management actions. Potential adaptive management actions for the LORP land management plan include:

- Modify utilization rates
- Modify grazing periods
- Modify stocking rate
- Install additional fencing
- Install additional or remove existing rare plant exclosures
- Install fences around sensitive seeps/springs
- Install additional stockwater sources
- Modify supplement locations (salt blocks, sweet feeds, etc.)

Utilization Monitoring. Utilization is defined as the proportion of current year's forage production that is consumed and/or destroyed by grazing animals, including livestock, wildlife (e.g., elk), and insects as compared to the amount of forage produced during the same growing year. Utilization rates are generally, and will be under LORP, measured by establishing utilization cages in pastures and comparing the average height of the key forage species inside the cage (ungrazed) and outside of the cage (grazed). The percent utilization of each key forage species is then determined by using a height-weight curve, which converts the difference in the average height of the grazed and ungrazed plants into percent of biomass removed. These height-weight curves are species-specific curves that represent the mathematical relationship between the height and biomass of a plant based on its dry weight.

Key forage species are species that are preferred by livestock for foraging and are abundant enough to be used to monitor utilization rate. Key forage species that will be used to monitor utilization in the LORP area include: saltgrass (*Distichlis spicata*), sedges (*Carex* spp), alkali muhly (*Muhlenbergia asperifolia*), beardless wild rye (*Leymus cinereus*), creeping wild rye (*Leymus triticoides*), and alkali sacaton (*Sporobolus airoides*). Other forage species may be included on a site-specific basis if they are found to be abundant and grazed by livestock in a particular area.

Utilization cages will be located in key areas identified by LADWP Watershed Resources staff to be representative of a pasture. These cages will be positioned in selected pastures prior to the arrival of livestock. Each utilization cage will be 1.5 meter by 1.5 meter in size. The utilization cages will be moved on an annual or seasonal basis, depending on the specific livestock operations of the lease. This is necessary to ensure that utilization of the forage produced during the same growing year will be measured.

Monitoring of utilization will be conducted by the lessees and LADWP. LADWP will train lessees in how to determine utilization percentages. The utilization rate of a pasture will be measured at least twice during the grazing period. During the initial phases of implementation, utilization may be determined more frequently. Lessees will report to LADWP when the observed utilization rate is approaching the maximum allowable utilization rate. LADWP staff will verify the utilization rate and determine whether the maximum allowable utilization rate has been reached. Following removal of livestock at the end of the use period, the total utilization for a pasture will be determined and documented.

The specific methodology for determining utilization can be found in Appendix G. The utilization methodology presented in Appendix G has been adapted from the Interagency Technical Reference "Utilization Studies and Residual Measurements" (BLM et al., 1996b).

Rangeland Trend Monitoring. The rangeland trend monitoring program will provide vegetation data necessary to evaluate the response of range condition and trend to changes in livestock management practices. Rangeland trend will be monitored annually in non-irrigated lands on all leases. Monitoring of rangeland trend will be conducted at permanent transect locations and will consist of recording:

- Foliar and basal cover for grasses and grass-likes (percent cover by species)
- Foliar cover of shrubs, subshrubs, and annuals (percent cover by species)
- Substrate cover (percent cover bare ground, litter, rock, dung, and cryptogamic crust)
- Visual obstruction (an index of vertical vegetation structure)
- Age distribution of shrubs

Sampling protocols and data summary will follow procedures outlined in the Interagency Technical Reference "Sampling Vegetation Attributes" (BLM et al., 1996a). Sampling will be done at the height of the growing season (June – July). Both forage and non-forage species as well as woody vegetation will be included in the trend monitoring.

Permanent sampling transects will be established primarily in vegetation communities classified as Type C in the Green Book (LADWP and Inyo County, 1990) (grass-dominated communities, including alkali meadow, alkali seep, rabbitbrush meadow, and Nevada saltbush meadow). These communities were selected for trend monitoring because they would likely be areas of livestock concentration due to forage availability, and be more responsive to changes in management than more xeric communities. A minimum of three transects will be established in each lease, with the exception of the Intake lease, in which only one transect will be established due to its small size. Sampling of rangeland trend will also take place in exclosures along the river designated as reference areas (excluded from livestock grazing; see Section 2.8.2). Trend data collected from grazed areas will be compared to data from the ungrazed reference areas to evaluate the influence of grazing on cover, frequency, and shrub age structure of the vegetation community.

In addition to measuring the trend parameters, general view photos and close-up photos will be taken at each transect location at the height of the growing season (June – July) to provide visual documentation of conditions.

Other Monitoring Activities. Annual field inspections will be conducted every year for the first three years of LORP implementation to inspect the conditions of fences and evaluate the location of salt/supplements and stockwater, etc. After the initial three years, field inspections will be conducted every three years. Field evaluations will be conducted at the end of the grazing period. Inspection visits to visually compare controls with reference pastures (exclosures) will be conducted in years 2, 5, 7, 10, and 15.

2.8.2 Description of Specific Management Actions on Individual Leases

2.8.2.1 Twin Lakes Lease

Current Management. Twin Lakes is the northernmost lease in the LORP (Figure 2-18). 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. The river channel through this lease (4.5 miles) is mostly dry. The Twin Lakes lease is a 4,912-acre cow/calf operation and is situated just south of the Intake of the Los Angeles Aqueduct. It is currently managed as a single pasture. The Lower Owens River is located on the east side 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. The current practice is to release cattle into the lease and let available vegetation and existing water determine their grazing patterns. Most of the water- and forage-producing areas occur in the south end of the pasture, along the Blackrock Ditch and around Drew Slough in the southwest corner of the lease.

Livestock numbers are provided for each respective lease using Animal Unit Month (AUM) for grazing units. An AUM is characterized as the amount of forage required to sustain a cow and her calf for one month. AUMs for each lease are presented as a range to allow for adjustments due to variances in precipitation, class of livestock, forage conditions and operational flexibility needs. The existing annual AUMs on the Twin Lakes lease range from 1,625 to 2,113. The lease provides seven months of fall through spring grazing, which begins in late October and ends in May.

Future Management. The primary future management action for the Twin Lakes lease is the establishment of a riparian pasture (Blackrock Riparian Pasture, 1,667 acres), requiring 4 miles of new fencing and a riparian grazing prescription to protect young willow development. The new riparian pasture would be established by constructing a north/south fence on the west side of the river (Figure 2-18). The proposed grazing prescription for the Blackrock Riparian Pasture is to graze livestock only in the spring, from early March to mid May. Riparian pastures will be grazed until 40 percent of the herbaceous forage is utilized or the specified grazing period ends, whichever comes first. When the cattle are not in the riparian pasture within this lease, they will be in the adjacent upland pasture (Blackrock Pasture), where the maximum allowable utilization rates for upland areas described in Section 2.8.1.3 will apply. The projected AUMs will be 1,625 to 2,113.

In addition, an existing 0.25-acre rare plant exclosure for Nevada oryctes located on this lease will be reconstructed, requiring 0.25 miles of new fencing. The exclosure will be closed to grazing year-round as a monitoring control.

There are two proposed water gaps in this lease to provide for stockwater, one at the north end and one in the middle of the riparian pasture (Figure 2-18).

2.8.2.2 Blackrock Lease

Current Management. 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 (Figure 2-19). The existing annual AUMs on the lease range from 7,340 to 8,915. The lease pastures provide eight months of fall through spring grazing, which begins in early to mid October and ends in mid May or June.

Future Management. The primary management action for the Blackrock lease is the establishment of five new riparian pastures, which would total 14,540 acres and require 20 miles of new fencing. These pastures include the White Meadow, Reservation, North River, South River, and Wrinkle Riparian Pastures. Cattle will graze these riparian pastures only for a short specified period in the spring (from late March or early April to mid or late May). Grazing will cease and cattle will be removed from riparian pastures when the utilization rate has reached 40 percent in riparian areas or the grazing period has ended, whichever occurs first. In upland areas, maximum allowable utilization rates for upland areas described above in Section 2.8.1.3 will apply. The projected AUMs will be 7,340 to 8,915.

In addition, four rare plant exclosures will be established to protect the Inyo County star-tulip and the Owens Valley checkerbloom. Three of the rare plant exclosures will use let-down fence panels to allow grazing outside the flowering, fruiting, and seeding period (April through July). The other exclosure will be closed to grazing year-round as a monitoring control.

In addition, two exclosures (each large enough to contain at least one 100-meter transect) will be established along the river and excluded from grazing to serve as monitoring controls.

Three stockwater sources will be developed on uplands east of the river and in the proposed Reservation and White Meadow pastures to better distribute cattle away from the Owens River riparian corridor. Cattle crossings will be installed at critical locations to better distribute cattle on uplands east of the river and to ensure minimal trailing of cattle in the riparian areas.

2.8.2.3 Thibaut Lease

Current Management. The 5,259-acre Thibaut Lease (Figure 2-20) is leased to three lessees for wintering pack stock. The lease is currently grazed as one large pasture by mules and horses. When the summer outfitting season ends in mid-September, the horses and mules are brought to the lease to graze the dry herbaceous forage from mid October 15 to mid June. Supplemental hay is fed starting in December until there is sufficient spring growth. The 2-mile long section of the Owens River that is included in this lease is currently a dry channel. With substantial open water and marsh habitats, only 4,650 acres of the lease are available as pasture for grazing. The annual AUMs on the existing lease are 2,700. This number is not a range since the lessees grazed the same number of livestock and made up for lost production by feeding more hay (supplemental feed).

Future Management. The primary management action for the Thibaut Lease is the creation of a new 847-acre riparian pasture (Thibaut Riparian Exclosure, Figure 2-20), requiring 2.4 miles of fencing on the west side of the river. This riparian pasture will not be grazed for a minimum of 10 years. After 10 years, LADWP Watershed Resources staff will assess the condition of vegetation in the exclosure and then determine whether grazing will be reintroduced into the area. If grazing is to be reintroduced, riparian utilization rates similar to those prescribed in other leases will be established. This riparian exclosure is proposed for the Thibaut lease since grazing by horses and mules has greater potential for impacts on riparian vegetation than cattle grazing, and the 10-year rest period is considered necessary to facilitate the establishment of riparian vegetation.

In addition, a new pasture will be created for a 247-acre waterfowl management area in the northwest corner of the lease (Figure 2-20). This waterfowl management area is part of the Thibaut Unit of the Blackrock Waterfowl Management Area, and as such, will be subject to periodic cycles of wetting and drying (see Section 2.5.3). Because the Thibaut Unit has been designated as the area of highest priority for flooding in order to achieve the 500 acres of flooded habitat for the Blackrock Waterfowl Management Area, this unit is expected to be wet in most years. The waterfowl management area pasture will be rested from grazing every other year to enable plant regrowth. This regrowth will provide

waterfowl cover the following fall, winter, and spring. When the Thibaut Unit is in a wet cycle, riparian utilization standards will apply to the waterfowl management area pasture, and the pasture will be grazed from October to March, or until the grazing utilization standard is reached, whichever occurs first. When the Thibaut Unit is in a dry cycle, the waterfowl management area pasture will be grazed from September to June or until the upland utilization criteria has been reached (see Section 2.8.1.3), whichever comes first. Livestock will be excluded the first year following implementation. During the second year of implementation, the pasture will be grazed up to 40 percent utilization, since it will be in a wet cycle. The pasture will be rested again in the third year. The waterfowl management area will be evaluated after each year and the prescription modified, as necessary, to promote desirable habitat conditions.

A new 211-acre pasture will be created along the east side of the Aqueduct to protect populations of the Inyo County star-tulip and the Owens Valley checkerbloom (Figure 2-20). The stock will be removed by March or when the upland utilization criteria is met, whichever occurs first. Livestock will not graze this pasture from early March to early October of each year. The removal of livestock during the Owens Valley checkerbloom flowering, fruiting, and seeding stages is needed because horses and mules choose checkerbloom and star-tulip as preferred forage.

The establishment of the rare plant and waterfowl management areas will require 3.5 miles of new fencing. Six miles of fence along the northern and southern boundaries of the lease will be reconstructed to exclude livestock from entering the exclosure from adjacent leases and to better control livestock.

Stocking rates will be reduced on this lease by 15 percent due to the decrease in acreage available for grazing as a result of the proposed riparian exclosure and seasonal restrictions placed on grazing in the rare plant and waterfowl management area pastures.

An existing artesian well will be modified to provide a reliable source of stockwater to a new stock tank (located on the eastside of the lease near the power line road).

2.8.2.4 Island Lease

Current Management. This lease is a 18,970-acre cow/calf operation divided into 11 pastures (Figure 2-21). The annual AUMs range from 8,540 to 9,350. 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 Owens River bisects the lease.

Future Management. The proposed management actions include development of two riparian pastures (Depot Riparian Pasture and Carrasco Riparian Pasture), requiring a total of 7.5 miles of new fencing. The two riparian pastures will be grazed only in the spring (February to April). In both riparian pastures, grazing will cease and cattle will be removed when the utilization of herbaceous forage has reached 40 percent on riparian sites or the grazing period has ended, whichever occurs first. The 406-acre Carrasco Riparian Pasture will require 2.5 miles of new fencing. The existing water gap at the northeast corner will remain to water livestock when they are using the terraces to the east. The 1,232-acre Depot Riparian Pasture will require 5 miles of fencing.

The 11,957-acre River Pasture, located mostly on the east side of the river channel, contains both uplands and wetlands. The riparian areas within this pasture will not be fenced; however, standard utilization rates for riparian and upland areas will apply. Grazing will be prohibited in the River Pasture from May to October of each year.

The remaining area (will be grazed from October to May using standard uplands utilization criteria. The projected AUMs will be 8,540 to 9,350.

In addition, one exclosure (large enough to contain at least one 100-meter transect) will be established along the river and excluded from grazing to serve as a monitoring control.

No new actions related to stockwater are proposed for this lease.

2.8.2.5 Delta Lease

Current Management. The Delta Lease is a cow/calf operation and consists of 7,110 acres divided into four pastures (Figure 2-23). The Owens River provides most of the stockwater. Grazing typically occurs for 6 months, from mid November to April. The annual AUMs on the existing lease range from 2,040 to 2,220.

Future Management. Proposed management for this lease applies to LADWP lands only, not State lands within the Delta Habitat Area. The current practice of excluding grazing from May through mid November will continue; however, grazing will end and cattle will be removed prior to the end of the grazing period if monitoring results show that average utilization rates on riparian sites have reached 40 percent. Upland utilization rates described in Section 2.8.1.3 will apply to upland areas. The projected AUMs will be 2,040 to 2,220.

A new 30-acre riparian exclosure, requiring 1.5 miles of fencing, will be established in the northeastern portion of the lease. The riparian exclosure will not be grazed by cattle for at least 10 years so that the vegetation response in the grazed riparian pastures can be compared with the pastures inside the exclosure. If monitoring indicates that desired riparian communities are not developing along the river sections, grazing management will be altered as part of the adaptive management plan (see Section 2.8.1.5).

In addition, a new fence will be constructed along the eastern property line of the Delta Lease to control livestock movement onto the highway east of Keeler Bridge. No actions related to stockwater are proposed for this lease.

2.8.2.6 Lone Pine Lease

Current Management. The Lone Pine Lease is a 8,274-acre cow/calf operation divided into 11 pastures and adjacent private ranch land (Figure 2-22). Grazing within the area not in the riparian pasture occurs year-round, as cows are rotated in different pastures on LADWP and private lands. The annual AUMs for this lease are currently 3,300. This number is not a range since the lessees grazed the same number of livestock and made up for lost production by feeding more hay and utilizing adjacent private property.

Future Management. Proposed management includes reconstruction of 4.5 miles of fence on the west side of the river to create a 6,016-acre pasture (consisting of approximately 550 acres of riparian areas and 5,466 acres of uplands) (River Riparian Pasture, Figure 2-22). The grazing prescription for the River Riparian Pasture is to graze livestock from early January through the end of March only. Grazing in riparian areas will cease and cattle will be removed when the utilization of herbaceous forage has reached 40 percent or the grazing period has ended, whichever occurs first. The only change to the lessees' current grazing practices is that livestock will not be allowed back on the River Riparian Pasture, as was previously practiced, from May 28 through June 12. Upland maximum allowable utilization rates described in Section 2.8.1.3 will apply to upland areas. The projected AUMs will be 3,300.

In addition, a new 8.5-acre riparian exclosure will be constructed and excluded from grazing to use as a monitoring control to compare to nearby grazed reaches of the river (Figure 2-22).

In order to better distribute livestock in the riparian pasture, an existing well in the center of Section 36 (east side of the river southern section) will be developed for stockwater.

2.8.2.7 Intake Lease

Current Management. The Intake Lease (approximately 284 acres) is used to graze horses and mules employed in a commercial packer operation. The lease is comprised of two pastures – the Intake (approximately 182 acres) and Big Meadow (approximately 102 acres). The annual AUMs for this lease currently range from 120 to 150.

Future Management. No new fencing is proposed for the management of this lease. The grazing prescription for the Big Meadow Pasture is to graze livestock from early January through February. Grazing in riparian areas will cease and livestock will be removed when the utilization of herbaceous forage has reached 40 percent or the grazing period has ended, whichever occurs first. The Intake Pasture will be managed as an upland pasture, using the upland maximum allowable utilization rates described in Section 2.8.1.3.

2.9 RECREATION MANAGEMENT

The LORP planning area is located on Los Angeles-owned land where the public has mostly unrestricted access for recreational uses during the day, with the exception of irrigated pastures. The primary recreational use is fishing in the river and in off-channel lakes and ponds. Camping is restricted to designated campgrounds outside the LORP project area. Off-road vehicular travel is prohibited. Hunting is allowed except in areas that are posted.

No changes to the current recreational uses in the LORP project area are proposed. Access to the river and off-channel lakes and ponds will be maintained. New fencing proposed under the project is designed to accommodate existing public access to these areas. There are no plans for new recreational facilities, including roads, trails, or campgrounds.

LADWP will install signs at key access points to the LORP area (such as Mazourka Canyon Road, Manzanar Reward Road, the pump station, and the Delta) describing LADWP policies on recreational uses of city-owned lands, contact information for reporting violations, and the location of fences across the river. LADWP's policies concerning recreational uses are described in Section 10.1.1. LADWP will prepare a brochure that identifies major access locations to the LORP area.

As part of the overall LORP management approach, LADWP and/or Inyo County will implement the recreation management strategies described below. Adverse impacts from recreational uses (as reported or observed by LADWP staff, Inyo County staff, or members of the public), and threats to resources, will be investigated promptly, and appropriate management action will be implemented in a timely manner. Implementation of specific strategies may be one time, continual, or seasonal (e.g., protecting of nesting birds during spring), depending on the observed or predicted recreational impacts. The management strategies may need to be modified in the future in response to increased recreational uses and associated human impacts. Such changes would be made as part of adaptive management through the process described in Section 2.10.5. Recreation management strategies include:

- For violations of the Fish and Game Code (e.g., unauthorized hunting or fishing, rare plant disturbance, and wildlife harassment), contact the Fish and Game Warden.

- For persistent violations of LADWP recreation policies (e.g., off-road vehicle travel, camping or campfires outside of designated areas, artifact disturbance or collection, woodcutting without a permit or outside of the allowable season):
  - Place flyers on windshields to alert recreational users of the relevant policies.
  - Post signs to alert recreational users of the relevant policies if violations are observed repeatedly in specific locations.
  - Install barriers (e.g., fencing, gates, boulders, etc.) to prevent access or redirect recreational activities away from sensitive resources.
  - Contact the Inyo County Sheriff Department.
- When vehicle or foot traffic patterns are observed to threaten or substantially damage sensitive resources (e.g., riparian or meadow vegetation, critical bird nesting areas, known cultural resources, or rare plants):
  - Install barriers (e.g., fencing, gates, boulders, etc.) to prevent access to or redirect recreational activities away from areas of sensitive resources.
  - Create designated trails, roads, wildlife viewing areas, parking areas, sanitation facilities, or other facilities to direct visitors away from the sensitive resources.
- Figure 2-24 (Sheets 1 through 5) indicate which roads are currently maintained by LADWP and Inyo County within the LORP Area. For degradation (e.g., substantial rutting, widening, or pot holes) of these existing maintained dirt roads or substantial increases in erosion and localized fugitive dust generation from vehicle traffic:
  - Install speed control devices or signage.
  - Conduct road maintenance (e.g., compaction and grading).
  - Install barriers (e.g., fencing, gates, boulders, etc.) to prevent access or redirect recreational activities away from areas of sensitive resources.
  - Place gravel on the road surface.
- To respond to littering, clean up trash using LADWP construction crews and/or laborers provided by the California Department of Forestry.
- For impacts to livestock operations resulting from increased recreation (e.g., open gates, livestock harassment, damage to pastures from vehicle traffic, etc.):
  - Install fences to keep livestock out of heavily recreated areas or to keep vehicles out of pastures.
  - Install cattle guards.
  - Lock gates were habitual problems occur.
  - Install “please close gates” signage.
  - Report livestock harassment to local law enforcement.

In addition to being implemented in the LORP area, the recreation management strategies listed above will be incorporated into a Land Management Plan for all City of Los Angeles lands in Inyo County, which is currently being prepared by LADWP for publication in 2007.

2.10 MONITORING AND ADAPTIVE MANAGEMENT

The overall goal of LORP is to establish and maintain healthy, functioning ecosystems in the four physical areas of the LORP. Because of the large scale and complexity of the LORP and inherent unpredictability of biological systems, the proposed method for ecosystem restoration is not to duplicate a particular ecological model, but to use monitoring and adaptive management to create desirable habitat for habitat indicator species.

The LORP includes a habitat monitoring program to assess the effects of proposed flow releases and other management actions on the habitat conditions of the LORP area (see Section 2.10.2). In addition to habitat monitoring, LORP includes flow compliance monitoring to ensure that the water releases are consistent with the MOU requirements (see Section 2.10.2) and water quality monitoring following the initial releases of baseflow and seasonal habitat flow (see Sections 2.3.5.2 and 2.3.5.4). Monitoring and adaptive management of rangelands on LADWP leases in the LORP area will be conducted as part of the LORP land management plan (see Section 2.8.1.5). Table 2-18 lists the components of the LORP monitoring program corresponding to the MOU goals.

If monitoring results indicate that the changes in environmental conditions are inconsistent with the LORP objectives, LADWP and the County will implement feasible adaptive management measures. The adaptive management approach is described below in Section 2.10.5.

2.10.1 Habitat Monitoring

The LORP habitat monitoring is designed to detect changes over time in the quantity and quality of habitat available in the project area. The habitat variables that will be monitored have been selected based on the habitat needs of the indicator species that have been identified in the LORP Action Plan. A series of tables that describe the relationship between the indicator species and various habitat attributes that will be monitored has been developed and is included in the *Lower Owens River Project – Draft Report / Baseline Data Methodologies* (Baseline Methodologies Report) (Ecosystem Sciences, 2003a), which is available for public review at LADWP office in Bishop. For example, these tables indicate for individual indicator species as well as for wildlife guilds (e.g., resident, migrant, and wintering waterfowl) if a species is neutral, positively correlated, or strongly positively correlated to a specific characteristic, such as canopy height. In addition, Technical Memoranda #14 (Fisheries and Habitat in the Lower Owens River), #19 (Riparian Wildlife Management: Summary of Management Concepts and Priorities), and #20 (Special Status Wildlife and Plants Species Accounts) include descriptions of habitat needs of habitat indicator species and special status species in the LORP area.

Habitat monitoring for the LORP will be conducted for the first 15 years. Monitoring for compliance regarding flow releases to the River and the Delta Habitat Area, flooding of Blackrock Waterfowl Habitat Area, and water levels at Off-River Lakes and Ponds will continue for the life of the project. Fifteen years is widely accepted to be the amount of time generally needed for an ecosystem to approach a steady state (M. Hill, Ecosystem Sciences, pers. comm., 2003). Over the course of the restoration process, currently identified monitoring components may be modified, and new monitoring may be developed as necessary.

In 2002 and 2003, baseline habitat surveys were conducted to establish sampling sites and to document pre-project conditions. The protocols used during the baseline surveys will be used for future LORP habitat monitoring. These protocols are summarized below and detailed in the Baseline Methodologies Report. Data collected during the baseline habitat surveys have been entered into a database. Subsequent monitoring data will be compared to the baseline data, and the results of the comparative analysis will be

presented in the annual reports, which will be presented to the Technical Group and be available for public review (see Section 2.10.4).

The LORP habitat monitoring program consists of the following components:

- Macro-scale monitoring (to observe major habitat changes, enable early detection of problem areas, and assess whether changes measured at the micro-scale are representative of the overall LORP area)
  - Rapid Assessment Surveys
  - Habitat Mapping
- Micro-scale monitoring (to identify biologically significant changes by measuring specific habitat features and to substantiate changes measured at the macro-scale)
  - Habitat Development Surveys
  - Fish Habitat Surveys
- Bird and Fish Census (to evaluate the relationship between habitat development changes in wildlife populations)
  - Riverine-Riparian Avian Census
  - Wetland Avian Census
  - Angling Census

Except for the Rapid Assessment Surveys, all of the above monitoring program components were completed as part of the baseline habitat surveys conducted in 2002 and 2003.

2.10.1.1 Rapid Assessment Surveys

The rapid assessment survey is a reconnaissance-level method of sampling that can be used to quickly detect and document key environmental changes across broad landscapes and identify problem areas. Under LORP, rapid assessment surveys will be used to record the following, using written documentation, mapping, and photographs:

1) Woody riparian recruitment – location, species, extent, density, height, and browsing of woody riparian species and understory development and condition. The objective is to document the initial recruitment and subsequent survival of riparian vegetation following seasonal habitat flows and natural flooding events.
2) Beaver activities – location, type, and intensity of beaver activities (to be conducted in the spring). The objective is to identify expanding beaver populations and help direct control efforts.
3) Exotic/noxious plants – location and species of exotic/noxious plants. The objective is to provide early detection of problem areas and help target control measures.
4) Wetted area (riparian and wetland flooding extent) – extent of wetted area, water elevations, and extent of emergent vegetation. The objective is to document changes in wetted area in response to the proposed wetting and drying cycles (Blackrock Waterfowl Habitat Area) and pulse flows/seasonal habitat flows (Delta Habitat Area).
5) Recreation/land use – location, type, intensity, and impacts of anthropogenic activities (recreation, grazing, burning, road and facility maintenance, plant control measures, etc.). The objective is to document seasonal and annual changes in land use and recreation patterns.

The rapid assessment surveys will be conducted along established routes as follows:

- Riverine-Riparian System – Eight 2-mile long routes along the river corridor (total of 16 miles)
- Blackrock Waterfowl Habitat Area – Three 1-mile long routes along the shorelines of the three primary management units (Thibaut, Winterton, and Waggoner; total of 9 miles)
- Delta Habitat Area – Four routes totaling 10 miles

Initially, the rapid assessment surveys will be conducted at least three times each year (spring, summer, and fall) to capture the seasonal changes in environmental conditions. The exact timing will be determined each year taking into account annual and seasonal variations in temperature, runoff, growing season, and water and land management. The number of rapid assessment surveys per year may be reduced in the future if it is determined that three per year is not necessary.

2.10.1.2 Habitat Mapping

Remote imagery (satellite and/or aerial photographs) will be acquired and interpreted to produce a digital vegetation/habitat map of the entire LORP area. Extensive field surveys were conducted in 2002 so that the remote imagery can be interpreted using the "photographic signatures" of the various vegetation types found on the ground. The map will be analyzed using a Geographic Information System (GIS) software to measure large-scale vegetation trends, describe habitat extent and distribution, document tule development, beaver dams, and open water areas. Remote imagery will be acquired during the growing season in the 2nd, 5th, 7th, 10th, and 15th years after initial flow releases. Imagery will be collected between June and September, dependent on weather and satellite conditions.

2.10.1.3 Habitat Development Surveys

Habitat development surveys will consist of measuring habitat characteristics that relate to the habitat indicator species, special status species, and plants of concern to Native Americans (e.g., taboose and willow) at permanent sampling sites. A total of 329 permanent sampling sites (242 in the riverine-riparian area, 58 in Blackrock Waterfowl Habitat Area, and 29 in Delta Habitat Area) will be surveyed during the growing season in years 2, 5, 7, 10, and 15.

Each sampling site (Figure 2-25) has been established along a 50-meter transect marked with T-posts at each end. In some areas, a longer transect (75 or 100 meters) will be used to capture additional plant communities. Each sampling site includes a Plant Species Plot, a Riparian Tree Inventory Plot, and a Channel Plot. Habitat characteristics that will be measured in each plot are:

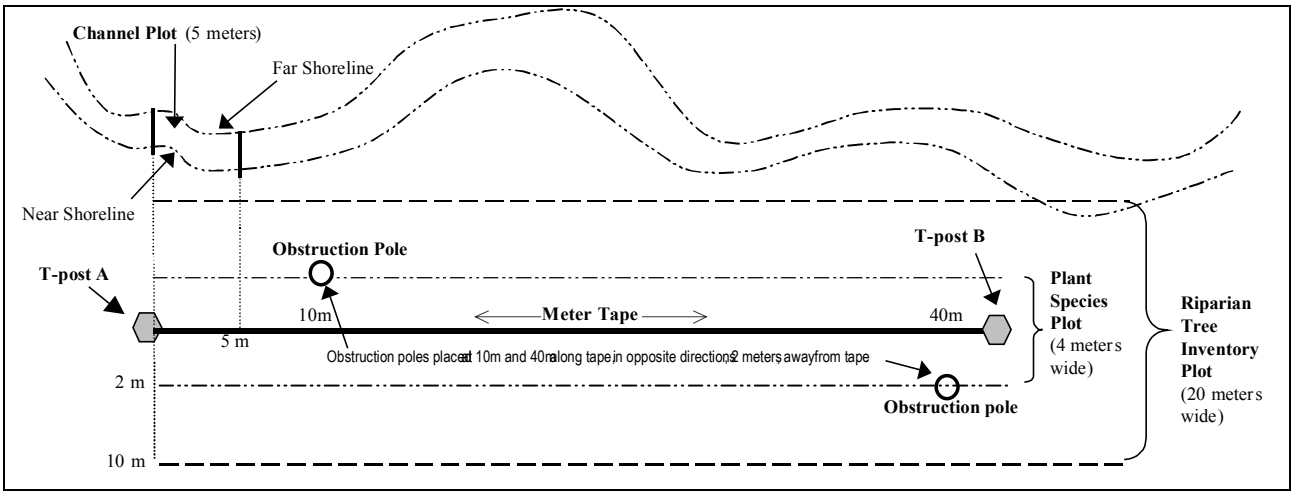
- Plant Species Plot (4-meter wide belt along transect)
  - At each meter along transect, record plant species in the appropriate height layer (herb, shrub, or tree).
  - Record location of all dominant species (greater than 20 percent cover) located within the plot.
  - List all species found within the plot.
  - Measure vertical vegetative cover density using obstruction poles (at 10 meters and 40 meters along transect).
  - Take landscape and close-up photographs at each end of transect.

- Riparian Tree Inventory Plot (20-meter wide belt along transect)
  - Record number of trees and seedlings by species, age and percent of dead trees, number of seedlings browsed by animals and damaged by beaver, distance of seedling from channel,

physiographic setting (shoreline, low terrace, mid-terrace, or high terrace) and hydrologic condition of seedling regeneration area, percent cover of competing vegetation, and competition with invasive species.
  - Record tree condition indicators for up to four trees located closest to T-post A (crown diameter, live crown ratio, live crown density, crown die-back, browsed sprouts/total sprouts, and crown structure).

- Channel Plot (5-meters long and as wide as the channel – in the Riverine-Riparian System and Delta Habitat Area)
  - Record height and percent cover of live and dead emergent vegetation and depth of water.

FIGURE 2-25
EXAMPLE HABITAT DEVELOPMENT SURVEY SAMPLING SITE

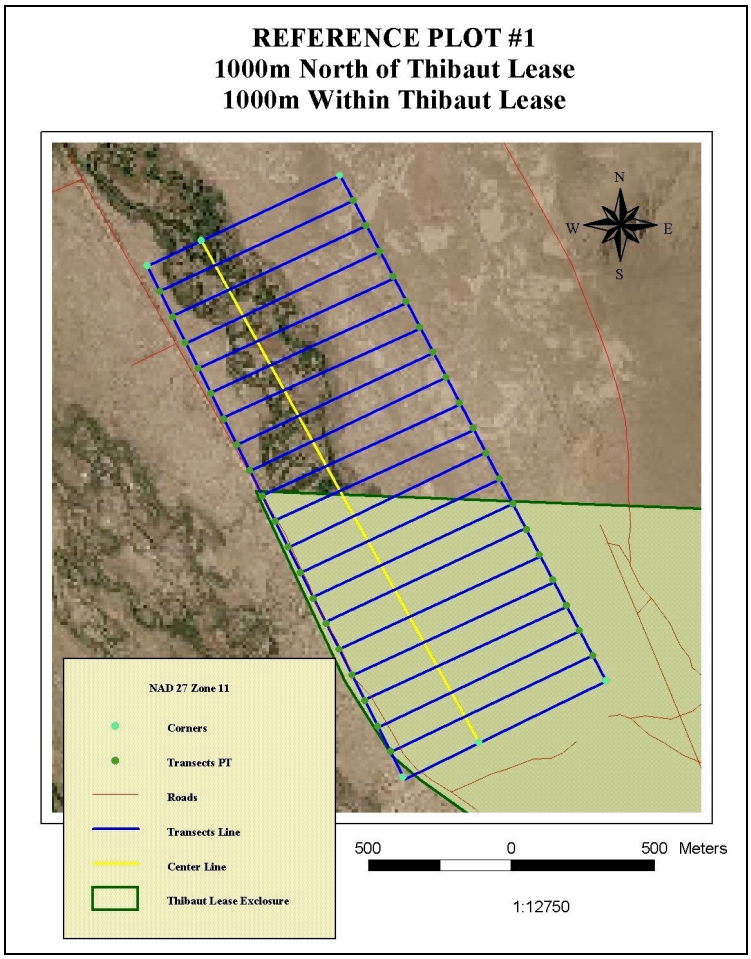


2.10.1.4 Fish Habitat Surveys

The objective of the fish habitat surveys is to measure aquatic habitat characteristics important to indicator fish species at representative reaches of the river. Fish habitat surveys will be conducted at five sampling plots along the Lower Owens River (two between the Intake and Mazourka Canyon Road; one between Mazourka Canyon Road and Islands; one between Islands and Lone Pine Station Road; and one between Lone Pine Station Road and Owens Lake). Fish habitat surveys will be conducted in September in years 3, 6, and 9.

Each fish habitat sampling plot is 2 kilometers in length, and transects have been established every 100 meters along the length of each plot (see Figure 2-26; 21 transects per sampling plot, excluding locations that are not accessible, for a total of approximately 100 transects).

FIGURE 2-26
EXAMPLE FISH HABITAT SURVEY SAMPLING PLOT



Along each transect line, the following fish habitat variables will be measured: channel width (at the top of bank or high water mark); wetted perimeter width; average and thalweg (deepest part of a stream) depths; substrate (boulder, rubble, gravel, and fines); canopy cover (amount of shading a stream receives from overhanging trees and shrubs); organic debris (amount of woody debris such as logs, root wads, and brush); and bank undercut (measurement of channel stability).

2.10.1.5 Riverine-Riparian Avian Census

A volunteer-based bird census will be conducted along the Lower Owens River at a total of 173 point count stations (12 transects have been established with eight to 15 points each; stations are a minimum of 250 meters apart). Point count stations will be censused annually (pending the availability of volunteers and funding for the coordination of volunteers) generally during the peak breeding season (late May to late June). The census will begin within 30 minutes after sunrise and be conducted for approximately 3 hours. At each point, birds detected (visually or by song/call) within 5 minutes are recorded. The distance of the bird from the observer (0 to 50 meters or greater than 50 meters) will also be recorded.

During the first census of the year, habitat characteristics within 50-meter radius plots around each point count station will be recorded to gather environmental data that can be related to bird numbers. Parameters to be recorded include dominant and secondary habitat type (Sawyer and Keeler-Wolf, 1995),

percent cover by height category (herb, shrub, or tree), number of snags (standing dead trees) and logs, width of riparian zone, percent riparian vegetation, and adjacent land uses.

2.10.1.6 Wetland Avian Census (Blackrock Waterfowl Habitat and Delta Habitat Area)

A volunteer-based bird census will be conducted along established routes in the Blackrock Waterfowl Habitat Area and Delta Habitat Area to detect migrant shorebirds, breeding species, and migrating and wintering waterfowl species. In the Blackrock Waterfowl Habitat Area, a total of 45 point count stations have been established for the four management units: Drew (8 stations), Winterton (9 stations), Waggoner (13 stations), and Thibaut (15 stations). In the Delta Habitat Area, a total of 42 stations have been established (25 stations along the west branch and 17 stations along the east branch).

The census will be conducted annually (pending the availability of volunteers and funding for the coordination of volunteers) with an emphasis on spring and fall migration of wetland species. Birds detected (visually or by song/call) within 5 minutes are recorded at each point. In addition, the following parameters are also recorded:

- Distance of the bird from the observer (0 to 50, 50 to 150, or greater than 150 meters)
- Activity of the bird at initial detection (flying, foraging, preening, resting, nesting, brooding, escaping, singing, calling, and other)
- The type of habitat the bird was using at initial detection (mud flat, shallow open-water wetland, deep open-water wetland, emergent marsh, wet alkali meadow, dry alkali meadow, seasonal wetland, open herbaceous flooded, open herbaceous not flooded, closed herbaceous flooded, closed herbaceous not flooded, playa, playa flooded, alkali sink scrub, Great Basin scrub, or riparian)

2.10.1.7 Angling Census

An angling census will be conducted to monitor the game fish population in the River and Off-River Lakes and Ponds. Four to five volunteer fisherpersons will be assigned to each of the five fishing areas, and will, at most, conduct the fishing census twice in May and twice in September using the same technique each time. The four fishing areas on the River are: River Intake to Mazourka Canyon Road; Mazourka Canyon Road to Manzanar-Reward Road; Manzanar Reward Road to Lone Pine Station Road; and Lone Pine Station Road to Pump Station. The Off-River Lakes and Ponds (Upper Twin, Lower Twin, Billy, Coyote, and Goose Lakes) is the fifth fishing area. The angling census will be conducted annually (pending the availability of volunteers) for 6 years after project implementation. Six years is widely accepted to be the amount of time generally required for fish populations to reach a self-sustaining level (i.e., recruitment is approximately equal to mortality) (M. Hill, Ecosystem Sciences, pers. comm., 2003).

Each fisherperson will spend a designated amount of time on each census day, and document the daily fishing results on census forms provided. Each fisherperson will record the fisherperson identification number, area fished, number of fish caught, and species, health (good or poor) and length of each fish caught.

2.10.2 Flow Compliance Monitoring

In addition to monitoring for changes in habitat conditions, the following flow compliance monitoring will be conducted for the life of the project to ensure that the water releases are consistent with the MOU requirements:

- Baseflow compliance
  - Until a stable baseflow of approximately 40 cfs has been established throughout the river, flow data will be recorded hourly and collected weekly from continuous recorders at 14 temporary gaging stations and three permanent gaging stations (at River Intake, Keeler Bridge, and pump station).
  - Once the baseflow has stabilized, flow data will be recorded hourly and collected monthly from continuous recorders at a minimum of four permanent gaging stations.
- Seasonal habitat flow compliance
  - During the first release of seasonal habitat flows, flow data will be recorded hourly and collected weekly from continuous recorders at 14 temporary gaging stations and three permanent gaging stations (same as above).
  - During subsequent seasonal habitat flows, data will be recorded hourly and collected weekly from continuous recorders at a minimum of four permanent gaging stations.
  - For the first five years of seasonal habitat flow releases, an aerial survey will be conducted using a LADWP helicopter to observe and video or photograph seasonal habitat flows at peak flows (Riverine-Riparian System and Delta Habitat Area).
- Delta Habitat Area flow compliance
  - Flows released to the Delta from the pump station will be recorded hourly and collected biweekly from a continuous recorder.
  - During the first year of project implementation, outflow from the Delta will be recorded hourly and collected biweekly from continuous recorders at temporary gaging stations established at the ends of the east and west branches.
- Blackrock Waterfowl Habitat Area wetland compliance
  - Discharges from spillgates, flows at diversions, and staff gage elevations that serve as indicators of flooded area will be measured approximately weekly for the first year of project implementation. The frequency of measurement may be decreased after the first year.
- Off-River Lakes and Ponds compliance
  - Staff gage elevations will be measured approximately weekly for the first year of project implementation. The frequency of measurement may be decreased after the first year.

2.10.3 Analysis

Spatial and numerical data on vegetation and habitat characteristics collected by remote imagery (Habitat Mapping) and field sampling (Habitat Development Surveys and Fish Habitat Surveys) will be analyzed primarily by trend analysis and the Habitat Suitability Index (HSI) model. The spatial data collected by the habitat mapping will be processed using GIS software to derive landscape level habitat attributes such as size, shape, distribution, and connectivity of various habitat types. The field data from the Habitat

Development Survey and Fish Habitat Surveys will be used to evaluate the direction and magnitude of changes in habitat variables at individual sampling sites.

Trend analysis is used to assess change over time in systems where use of control sites is not possible or appropriate. Trend analysis is a common approach for assessing change in recovering biological systems. Since it is not possible to define recovery in terms of the value of a single parameter, various habitat variables measured by the LORP monitoring program will be analyzed using several statistical methods to identify the direction and magnitude of change over time. To illustrate trends at individual sites, values of habitat variables will be plotted by time. Site-specific habitat losses and gains as well as long-term overall net change of the riparian/wetland habitat in the LORP area will be tracked.

HSI models are used to predict the suitability of habitat for a species based on an assessment of habitat attributes (Buckmaster et. al., 1999) assumed to be important variables for determining the presence, distribution, and/or abundance of a species or guild (species similar in their habitat needs and response to habitat changes). A habitat variable (e.g., percent shrub cover) is converted into a suitability index (SI) scaled from 0 to 1, 1 being the assumed optimal condition (e.g., greater than 30 percent shrub cover is assumed to be 1 or optimal on the SI). The overall HSI value for a particular species is calculated by mathematically combining the suitability index values for multiple habitat variables, and represents the expected response of the species to the combination of habitat attributes. As monitoring proceeds and values of the habitat variables change over time, the change in habitat suitability for a species over time will be estimated by recalculating the HSI values.

2.10.4 Reporting

The County and LADWP will prepare an annual report that includes data collected during the habitat and flow compliance monitoring, results of analysis, and recommendations on the need for adaptive management actions. The annual report will be reviewed by the Inyo/Los Angeles Technical Group and will also be made available to the public. The Technical Group meetings are open to the public, and meeting agendas are provided to the public in advance of each meeting.

2.10.5 Adaptive Management

Adaptive management is the systematic acquisition and evaluation of reliable information to improve management over time by adapting and building upon previous experience. The adaptive management approach is designed for management of complex ecosystems that have many components and interactions and uncertainties. The intent of the adaptive management approach is to avoid isolation of specific components, which can lead to resolution of local or partial problems at the expense of long-term and overall outcomes. Adaptive management learns from experience by integrating science and decision-making, documents successes and mistakes, monitors and evaluates effectiveness of past actions and makes continuous course corrections (USDA Forest Service, 1999).

Under LORP, adaptive management will be used to integrate information obtained from both micro-scale and macro-scale monitoring and make adjustments to the initially proposed flow regimes and other management actions. In general, diversity of wildlife communities in riparian and wetland habitats increase as structural complexity, productivity, and species and age diversity of vegetation increase. In addition, landscape patterns such as habitat block size, shape, and connectivity are also important factors in establishing and maintaining diverse habitats. The proposed flow releases and other management actions are anticipated to increase the total area of riverine-riparian and wetland habitat areas, increase the size and connectivity of the individual habitat areas, and increase the structural complexity, productivity, and diversity of vegetation communities within individual habitat areas.

If insufficient increases in the following parameters are observed, this would indicate habitat trends that are inconsistent with project goals and could necessitate adaptive management actions:

- Development of middle and understory foliage
- Vertical structure with clear stratification
- Development of live herbaceous and residual biomass
- Plant species richness (combined with dominance by a few species such as exotics)
- Age structure complexity and vegetative and/or new regeneration
- Success rate of new and vegetative recruits
- Vigor and vitality coupled with poor reproductive potential and resiliency
- Development of the woody riparian canopy (width)
- Connectivity between and among river reaches, their tributaries and associated springs, seeps, and wetlands
- Development of stand size and fragmentation of interior habitat

A description of the currently identified adaptive management measures associated with each of the four elements of the LORP is provided in Tables 2-19, 2-20, 2-21, and 2-22. Each table: (1) identifies the adaptive management measure, (2) describes the measure, (3) describes the purpose of the measure, and (4) describes the general conditions (as observed through the monitoring program) that will trigger consideration of implementation of the measure. Over the course of the restoration process, currently identified adaptive management measures may be modified, and new measures may be developed as necessary.

The Technical Group, Standing Committee, and the governing boards of LADWP and the County will make the ultimate decision on implementing adaptive management actions after reviewing the annual report and any other relevant monitoring data.

Numeric objectives or performance criteria such as acreages of habitat types or values of measurable habitat parameters have not been established to assess the project's success or as triggers for adaptive management actions for several reasons. First, the habitat needs of specific species or guilds are known in general terms, but the optimal conditions are difficult to express in quantitative terms in most cases. Second, different species have different and often competing habitat needs. A change in a habitat variable that is desirable for one habitat indicator species may be undesirable or irrelevant to another habitat indicator species. Third, ecological systems are dynamic by nature, and biological conditions at one point in time often cannot predict or illustrate the unseen dynamics that create change in the system. Area-specific changes in habitat attributes from one year to another may become irrelevant when put in the context of the long-term net changes in the overall LORP area. Therefore, establishing numeric objectives or performance criteria for multiple species in the large, complex, and dynamic ecosystem of the LORP is not proposed.

TABLE 2-18
RELATIONSHIP BETWEEN MOU GOALS AND LORP MONITORING COMPONENTS

MOU Goals		LORP Monitoring Component
Overall Goal		
B	*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.*	• Rapid Assessment Surveys (Section 2.10.1.1) • Habitat Mapping (Section 2.10.1.2) • Habitat Development Surveys (Section 2.10.1.3) • Fish Habitat Surveys (Section 2.10.1.4) • Riverine-Riparian Avian Census (Section 2.10.1.5) • Wetland Avian Census (Section 2.10.1.6) • Angling Census (Section 2.10.1.7) • Rangeland Monitoring (Section 2.8.1.5)
B.1	*Establishment and maintenance of diverse riverine, riparian and wetland habitats in a healthy ecological condition. The LORP Action Plan identifies a list of "habitat indicator species" for each of the areas associated with the four physical features of the LORP. Within each of these areas, the goal is to create and maintain through flow and land management, to the extent feasible, diverse natural habitats consistent with the needs of the "habitat indicator species." These habitats will be as self-sustaining as possible.*	
B.2	*Compliance with state and federal laws (including regulations adopted pursuant to such laws) that protect Threatened and Endangered Species.*	
B.3	*Management consistent with applicable water quality laws, standards and objectives.*	• Baseflow Water Quality (Section 2.3.5.2) • Baseflow Fish Conditions (Section 2.3.5.2) • Seasonal Habitat Flow Water Quality (Section 2.3.5.4) • Seasonal Habitat Flow Fish Conditions (Section 2.3.5.4)
B.4	*Control of deleterious species whose presence within the Planning Area interferes with the achievement of the goals of the LORP. These control measures will be implemented jointly with other responsible agency programs.*	• Rapid Assessment Surveys (Section 2.10.1.1) • Habitat Development Surveys (Section 2.10.1.3)
B.5	*Management of livestock grazing and recreational use consistent with the other goals of the LORP.*	• Rapid Assessment Surveys (Section 2.10.1.1) • Rangeland Monitoring (Section 2.8.1.5)

TABLE 2-18 (continued)

MOU Goals		LORP Monitoring Component
Riverine-Riparian System		
C.1.a.	*The goal for the Lower Owens River Riverine-Riparian System is to create and sustain healthy and diverse riparian and aquatic habitats, and a healthy warm water recreational fishery with healthy habitat for native fish species. Diverse natural habitats will be created and maintained through flow and land management , to the extent feasible, consistent with the needs of the "habitat indicator species" for the riverine-riparian system. These habitats will be as self-sustaining as possible.*	• Rapid Assessment Surveys (Section 2.10.1.1) • Habitat Mapping (Section 2.10.1.2) • Habitat Development Surveys (Section 2.10.1.3) • Fish Habitat Surveys (Section 2.10.1.4) • Riverine-Riparian Avian Census (Section 2.10.1.5) • Angling Census (Section 2.10.1.7)
C.1.b.i	*A base flow of approximately 40 cfs from at or near the Intake to the pumpback system to be maintained year round.*	• Baseflow Compliance (Section 2.10.2)
C.1.b.ii	*It is currently estimated that in years when the runoff in the Owens River watershed is forecasted to be average or above average, the amount of planned seasonal habitat flows will be approximately 200 cfs, unless the Parties agree upon an alternative habitat flow, with higher unplanned flows when runoff exceeds the capacity of the Los Angeles Aqueduct. (The runoff forecast for each year will be DWP's runoff year forecast for the Owens River Basin, which is based upon the results of its annual April 1 snow survey of the watershed.) In years when runoff 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.*	• Seasonal Habitat Flow Compliance (Section 2.10.2)
	The purpose of the habitat flow is the creation of a natural disturbance regime that produces a dynamic equilibrium for riparian habitat, the fishery, water storage, water quality, animal migration and biodiversity which results in resilient and productive ecological systems. To achieve and maintain riparian habitats in a healthy ecological condition, and establish a healthy warm water recreational fishery with habitat for native species, the plan will recommend habitat flows of sufficient frequency, duration and amount that will (1) minimize the amount 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 banks, floodplain 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	• Rapid Assessment Surveys (Section 2.10.1.1) • Habitat Mapping (Section 2.10.1.2) • Habitat Development Surveys (Section 2.10.1.3) • Seasonal Habitat Flow Compliance (Section 2.10.2) • Seasonal Habitat Flow Water Quality (Section 2.3.5.4) • Seasonal Habitat Flow Fish Conditions (Section 2.3.5.4)

TABLE 2-18 (continued)

	MOU Goals	LORP Monitoring Component
	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 objectives; and (7) enhance the river channel.	
C.1.b.iii	*A continuous flow in the river channel will be maintained to sustain fish during periods of temporary flow modifications.*	• Baseflow Compliance (Section 2.10.2) • Baseflow Water Quality (Section 2.3.5.2) • Baseflow Fish Conditions (Section 2.3.5.2) • Seasonal habitat Flow Compliance (Section 2.10.2) • Seasonal Habitat Flow Water Quality (Section 2.3.5.4) • Seasonal Habitat Flow Fish Conditions (Section 2.3.5.4)
C.1.c	*Appropriately placed gaging stations in sufficient numbers (to include at least 4 stations) to measure and manage the flow in the river channel will be established as identified in the LORP Plan. These stations will be sited so that flow can be managed in each of the hydrologically varying sections of the river channel in order to meet the goals and objectives of the LORP.*	• Baseflow Compliance (Section 2.10.2) • Seasonal Habitat Flow Compliance (Section 2.10.2)
Delta Habitat Area		
C.2	*The goal is 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 areas and ponds suitable for shorebirds, waterfowl and other animals within the Owens River Delta Habitat Area. Diverse natural habitats will be created and maintained through flow and land management, to the extent feasible, consistent with the needs of the "habitat indicator species" for the Owens River Delta Habitat Area. These habitats will be as self-sustaining as possible.*	• Rapid Assessment Surveys (Section 2.10.1.1) • Habitat Mapping (Section 2.10.1.2) • Habitat Development Surveys (Section 2.10.1.3) • Wetland Avian Census (Section 2.10.1.6)
	Subject to applicable court orders concerning the discharge of water onto the bed of Owens Lake, the quantity of water that will be released below the pumpback station for these purposes will be an annual average of approximately 6 to 9 cfs (not including water that is not captured by the station during periods of seasonal habitat flows).	• Delta Flow Compliance (Section 2.10.2)

TABLE 2-18 (continued)

MOU Goals		LORP Monitoring Component
Off-River Lakes and Ponds		
C.3	*The goal is to maintain and/or establish these off-river lakes and ponds to sustain diverse habitat for fisheries, waterfowl, shorebirds and other animals as described in the EIR. Diverse natural habitats will be created and maintained through flow and land management, to the extent feasible, consistent with the needs of the "habitat indicator species" for the Off-River Lakes and Ponds. These habitats will be as self-sustaining as possible.*	• Off-river Lakes and Ponds Compliance (Section 2.10.2) • Habitat Mapping (Section 2.10.1.2) • Angling Census (Section 2.10.1.7)
Blackrock Waterfowl Habitat Area		
C.4	*The goal is to maintain this waterfowl habitat area to provide the opportunity for the establishment of resident and migratory waterfowl populations as described in the EIR and to provide habitat for other native species. Diverse natural habitats will be created and maintained through flow and land management, to the extent feasible, consistent with the needs of the "habitat indicator species" for the Blackrock Waterfowl Habitat Area. These habitats will be as self-sustaining as possible.*	• Rapid Assessment Surveys (Section 2.10.1.1) • Habitat Mapping (Section 2.10.1.2) • Habitat Development Surveys (Section 2.10.1.3) • Wetland avian census (Section 2.10.1.6)
	Approximately 500 acres of the habitat area will be flooded at any given time in a year when the runoff to the Owens River watershed is forecasted to be average or above average. In years when the runoff is forecasted to be less than average, the water supply to the area will be reduced in general proportion to the forecasted runoff in the watershed.	• Blackrock Waterfowl Habitat Area Wetland Compliance (Section 2.10.2) • Rapid Assessment Surveys (Section 2.10.1.1) • Habitat Mapping (Section 2.10.1.2)

TABLE 2-19
RIVERINE-RIPARIAN SYSTEM ADAPTIVE MANAGEMENT MEASURES

Measure	Description	Purpose	Monitoring Trigger
Modify releases during establishment of baseflows	Release higher quality water from spillgates. Any such releases from spillgates will continue until (1) water quality at the monitoring station linked to the spillgate and in the river below the spillgate channel rises above the water quality thresholds, or (2) fish at the monitoring stations are not exhibiting signs of stress. If releases from one or more of these spillgates are required, flows to the river will be adjusted so that approximately 40-cfs are maintained.	Improve water quality and create freshwater refuges for fish, as needed, at three spillgate returns along the wet reach of the river.	See Table 2-9
Modify releases to maintain baseflows	Increase release rates from the River Intake and/or from spillgates to increase flow in the river to approximately 40 cfs.	Maintain a flow of approximately 40 cfs throughout the river.	Monitoring data indicate that a flow of approximately 40 cfs is not being maintained along the length of the river, based on data collected at one or more of the temporary and/or permanent monitoring stations.
Release higher quality water from spillgates during the first three releases of seasonal habitat flows	During the first three releases of a seasonal habitat flow, if necessary, release higher quality water from spillgates. Any such releases from spillgates will continue until (1) the water quality has improved above the water quality thresholds, or (2) the fish are not exhibiting signs of stress.	Improve water quality and create freshwater refuges for fish, as needed, at three spillgate returns along the wet reach of the river.	See Table 2-9
Modify the timing of seasonal habitat flows	Adjust timing of seasonal habitat flows to maximize seed dispersal and germination and avoid seeding period of exotic species.	Better achieve habitat goals.	Monitoring data indicate that seasonal habitat flows are being released outside of the peak time of seed development and/or flows need to be adjusted to account for variable seed development between upper and lower river reaches. A determination that the habitat goals are not being achieved will be based upon monitoring data that show that habitats are not achieving desired trend in habitat characteristics that relate to understory structure and composition and recruitment that are important to the "habitat indicator species," special status wildlife species, and plants of concern to Native Americans.
Modify the ramping pattern of seasonal habitat flows	Adjust the peak flow and/or length of time during which seasonal habitat flows are released.	Better achieve habitat goals. Conserve water if habitat goals won't be compromised.	Habitat goals are not being achieved because the flow pattern and duration are not optimal. A determination that the habitat goals are not being achieved will be based upon monitoring data that show riparian plants are not being recruited (within the first 5 years) or sustained through time (within the 15-year monitoring period) in areas subject to out-of-channel flooding from seasonal habitat flows.
Modify schedules for maintenance and	Adjust timing of maintenance activities or mechanical intervention activities.	Minimize interference with bird nesting or	Maintenance and/or mechanical intervention activities are interfering with bird nesting, or migration, plant seeding, etc. Interference will be

TABLE 2-19 (continued)

Measure	Description	Purpose	Monitoring Trigger
mechanical intervention activities		migration, plant seeding, etc.	avoided by scheduling maintenance during non- critical periods.
Plant native vegetation species	Encourage the establishment of vegetation at specific sites.	Augment natural revegetation processes where necessary.	Natural revegetation is not occurring to the extent expected even after adjustments of seasonal habitat flows and/or adjustments to grazing management.
Disperse native plant seeds during seasonal habitat flows	Disperse seeds of native vegetation into the river during seasonal habitat flows and/or into areas that will be inundated by seasonal habitat flows.	Augment natural revegetation processes where necessary.	Natural revegetation is not occurring to the extent expected.
Remove tules	Maintain stream flow by controlling tules.	Mechanically remove tules from the stream channel.	Tule growth is hindering stream flow or achievement of habitat goals.
Modify beaver and beaver dam control activities	Increase ongoing efforts to control beavers and/or to remove beaver dams	Mechanically remove beaver dams and/or trap beavers	Beaver activity is hindering achievement of habitat goals. A determination that beaver activity is hindering the achievement of habitat goals will be based upon monitoring data that show flooding due to beaver dams is causing the death of tree species and/or preventing the growth or development of new trees in suitable riparian areas.
Modify fencing, or addition of new fencing, for riparian and upland pastures	Install new fencing, move an existing fence alignment, or remove fencing to obtain desired cattle distribution and control.	Better manage livestock grazing	Existing livestock grazing strategies are hindering achievement of habitat goals, based upon monitoring data that show recruitment or growth of desired vegetation is prevented or inhibited due to current grazing strategies, requiring a grazing management change.
Modify utilization rates and timing within riparian and upland pastures	Alter utilization rates employed to manage livestock grazing and/or alter timing of livestock grazing	Better achieve habitat goals by improving riparian vegetation recruitment and growth	Existing livestock grazing strategies are hindering achievement of habitat goals, based upon monitoring data that show recruitment or growth of desired vegetation is prevented or inhibited due to current grazing strategies, requiring a grazing management change.
Install grazing exclosures	Add new grazing exclosures or remove exclosures.	Better protect areas of sensitive, threatened or endangered species, and/or promote site specific recovery	Livestock grazing may potentially affect sensitive, threatened or endangered plants. A determination that livestock grazing could affect sensitive, threatened or endangered plants will be based upon monitoring data that shows grazing is either facilitating or preventing the health and protection of T&E plant populations, which determines the necessity for exclosures.
Modify livestock management following wildfire	Temporarily eliminate livestock grazing, reduce utilization rates and/or change timing of grazing following a wildfire.	Promote recovery of habitat following a wildfire.	Wildfire affects a portion of the project area and the site is not recovering adequately.

TABLE 2-20
DELTA HABITAT AREA ADAPTIVE MANAGEMENT MEASURES

Measure	Description	Purpose	Monitoring Trigger
Modify baseflow release of in the years after the first year following project implementation	Adjust the amount of baseflow released at the pump station (while maintaining a flow within the 6 to 9 cfs annual average requirements of the MOU) to better achieve the goals for the Delta.	Better achieve the goals for the delta, and conserve water if possible within the MOU goals.	(1) A decrease of 10 percent 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 defined above) as estimated from aerial or satellite imagery or other appropriate methods (see also Section 2.10.1). (2) A 20 percent or greater reduction in habitat suitability index (areal extent and habitat quality; see Section 2.10.3) as measured at 5-year intervals after the commencement of releases of baseflows to the Delta. (3) A reduction in baseflows to the Delta will be considered if monitoring indicates: 1) an increase of 10 percent or more in area during any 3-year period from the "Delta conditions", and 2) an increase of 20 percent or more in habitat suitability index as measured at 5-year intervals.
Modify magnitude of pulse flows	Adjust amount of pulse flow released at pump station (within the 6 to 9 cfs annual average required by the MOU)	Better achieve habitat goals, and conserve water if possible within the MOU goals.	
Modify duration and/or timing of pulse flows	Adjust the length of time during which a pulse flow is released from the pump station (within the 6 to 9 cfs annual average required by the MOU)	Better achieve habitat goals.	
Berm/excavate the river channel upstream of the Delta	Increase the channel capacity of the river upstream of the delta via excavation or raising the western banks.	Better achieve habitat goals	Observations indicate that a portion of either the pulse flows or the seasonal habitat flows released to the Delta from the pump station are not reaching the primary Delta habitat area because the flows are escaping the river channel upstream of the primary habitat area. As a result, monitoring data indicate that habitat goals are not being achieved because the flows reaching the primary habitat area are insufficient.
Plant native vegetation species	Plant native vegetation to encourage the establishment of vegetation at specific sites	Augment natural revegetation processes where necessary	Natural revegetation is not occurring to the extent expected even after adjustments of baseflows and pulse flows and/or adjustments to grazing management. A determination that sufficient natural revegetation is not occurring will be based upon monitoring data that show suitable sites support less than half of the vegetation on similar, adjacent sites.
Disperse native plant species seeds during seasonal habitat flows	Disperse seeds of native vegetation into the river during seasonal habitat flows and/or into areas that will be inundated by seasonal habitat flows	Augment natural revegetation processes where necessary	Natural revegetation is not occurring to the extent expected. A determination that sufficient natural revegetation is not occurring will be based upon monitoring data that show suitable sites support less than half of the vegetation on similar, adjacent sites.
Remove tules	Control tules to maintain stream flow	Mechanically remove tules	Tule growth is hindering stream flow or achievement of habitat goals.
Remove beavers and beaver dams	Control beavers and/or to remove beaver dams	Mechanically remove beaver dams and/or trap beavers	Beaver activity is hindering achievement of habitat goals. A determination that beaver activity is hindering the achievement of habitat goals will be based upon monitoring data that show excessive flooding is inhibiting the growth or development of vegetation.
Modify fencing, or addition of new fencing, for riparian and upland pastures	Install new fencing, move an existing fence alignment, or remove fencing to obtain desired cattle distribution and control	Better manage livestock grazing	Existing livestock grazing strategies are hindering achievement of habitat goals. based upon monitoring data that show recruitment or growth of desired vegetation is prevented or inhibited due to current grazing strategies, requiring a grazing management change.

TABLE 2-20 (continued)

Measure	Description	Purpose	Monitoring Trigger
Modify utilization rates and timing within riparian and upland pastures	Alter utilization rates employed to manage livestock grazing and/or alter timing of livestock grazing	Better achieve habitat goals by improving riparian vegetation recruitment and growth	Existing livestock grazing strategies are hindering achievement of habitat goals. based upon monitoring data that show recruitment or growth of desired vegetation is prevented or inhibited due to current grazing strategies, requiring a grazing management change.
Install of grazing exclosures	Add new grazing exclosures or remove exclosures.	Better protect areas of sensitive, threatened or endangered species, and/or promote site specific recovery	Livestock grazing may potentially affecting sensitive, threatened or endangered plants. A determination that livestock grazing could adversely affect sensitive, threatened or endangered plants will be based upon monitoring data that shows grazing is either facilitating or preventing the health and protection of T&E plant populations, which determines the necessity for exclosures.
Modify livestock management following wildfire	Temporarily eliminate livestock grazing, reduce utilization rates and/or change timing of grazing following a wildfire	Promote recovery of habitat following a wildfire	Wildfire affects a portion of the project area.

TABLE 2-21
BLACKROCK WATERFOWL HABITAT AREA ADAPTIVE MANAGEMENT MEASURES

Measure	Description	Purpose	Monitoring Trigger
Modify timing and/or duration of wet/dry cycles	Alter the drying and wetting cycle for the management units	Better achieve the goals this element of the project	The drying and wetting cycle can be altered as necessary if monitoring indicates shorter or longer cycles are better for management of the wetlands.
Controlled burning	Burn areas of the Blackrock area	Improve plant diversity and reduce monocultures	Monitoring data indicate plant diversity is low and a monoculture of cattails and bulrushes is developing.
Modification of beaver and beaver dam control activities	Increase efforts to control beavers and/or to remove beaver dams	Mechanically remove beaver dams and/or trap beavers	Beaver activity is hindering achievement of habitat goals. A determination that beaver activity is hindering the achievement of habitat goals will be based upon monitoring data that show excessive flooding is inhibiting the growth or development of vegetation.
Modify fencing, or addition of new fencing, for riparian and upland pastures	Install new fencing, move an existing fence alignment, or remove fencing to obtain desired cattle distribution and control	Better manage livestock grazing	Existing livestock grazing strategies are hindering achievement of habitat goals. Based upon monitoring data that show recruitment or growth of desired vegetation is prevented or inhibited due to current grazing strategies, requiring a grazing management change.
Modify utilization rates and timing within riparian and upland pastures	Alter utilization rates employed to manage livestock grazing and/or alter timing of livestock grazing	Better achieve habitat goals by improving riparian vegetation recruitment and growth	Existing livestock grazing strategies are hindering achievement of habitat goals. Based upon monitoring data that show recruitment or growth of desired vegetation is prevented or inhibited due to current grazing strategies, requiring a grazing management change.
Install grazing exclosures	Add new grazing exclosures or remove exclosures	Better protect areas of sensitive, threatened or endangered species, and/or promote site specific recovery	Livestock grazing may potentially affect sensitive, threatened or endangered plants. A determination that livestock grazing could adversely affect sensitive, threatened or endangered plants will be based upon monitoring data that shows grazing is either facilitating or preventing the health and protection of T&E plant populations, which determines the necessity for exclosures.
Modify livestock management following wildfire	Temporarily eliminate livestock grazing, reduce utilization rates and/or change timing of grazing following a wildfire	Promote recovery of habitat following a wildfire	Wildfire affects a portion of the project area and the site is not recovering adequately

TABLE 2-22
OFF-RIVER LAKES AND PONDS & GRAZING ADAPTIVE MANAGEMENT MEASURES

Measure	Description	Purpose	Monitoring Trigger
Modify releases to maintain lakes	Alter amount of water supplied to lakes	Better maintain lake levels	Staff gages measurements show that lake levels are not being maintained at target levels.
Modify fencing, or addition of new fencing	Install new fencing, move an existing fence alignment, or remove fencing to obtain desired cattle distribution and control	Better manage livestock grazing	Existing livestock grazing strategies are hindering achievement of habitat goals. Based upon monitoring data that show recruitment or growth of desired vegetation is prevented or inhibited due to current grazing strategies, requiring a grazing management change.
Modify utilization rates and timing within pastures	Alter utilization rates employed to manage livestock grazing and/or alter timing of livestock grazing	Better achieve habitat goals by improving riparian vegetation recruitment and growth	Existing livestock grazing strategies are hindering achievement of habitat goals. Based upon monitoring data that show recruitment or growth of desired vegetation is prevented or inhibited due to current grazing strategies, requiring a grazing management change.
Install grazing exclosures	Add new grazing exclosures or remove exclosures	Better protect areas of sensitive, threatened or endangered species, and/or promote site specific recovery	Livestock grazing may potentially affect sensitive, threatened or endangered plants. A determination that livestock grazing could adversely affect sensitive, threatened or endangered plants will be based upon monitoring data that shows grazing is either facilitating or preventing the health and protection of T&E plant populations, which determines the necessity for exclosures the potential for loss of T&E plant species.
Modify livestock management following wildfire	Temporarily eliminate livestock grazing, reduce utilization rates and/or change timing of grazing following a wildfire	Promote recovery of habitat following a wildfire	Wildfire affects a portion of the project area and the site is not recovering adequately