11.0 ALTERNATIVES

11.1 REQUIREMENTS TO EVALUATE ALTERNATIVES

11.1.1 CEQA Requirements

The key requirements under CEQA to identify and evaluate alternatives in an Environmental Impact Report are listed below from the CEQA Guidelines:

- 15126.6(a) states that "*An EIR shall describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives*."

- 15126.6 (b) states that *"…the discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly*."

- 15126.6(c) states "*The range of potential alternatives to the proposed project shall include those that could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects*."

Under CEQA, the lead agency must attempt to identify feasible alternatives that will avoid, or at least lessen, any significant impact. The lead agency must determine what represents a feasible alternative, taking into account costs and engineering feasibility, and how the alternative may inhibit meeting the project objectives. An alternative cannot be dismissed simply because it prevents the project objectives from being fully realized. Any new environmental impacts of an alternative must also be considered.

11.1.2 NEPA Requirements

The NEPA regulations (40 CFR 1502.14) state that the alternatives analysis "*… is the heart of the environmental impact statement…. It should present the environmental impacts of the proposal and the alternatives in comparative form, sharply defining the issues and providing a clear basis for choice among options by the decision makers and the public.*" The EIS must explore and objectively evaluate all reasonable alternatives, including the No Action Alternative, as well as reasonable alternatives not within the jurisdiction of the lead agency. The analysis must provide sufficient information on the alternatives so that the public and decision makers may evaluate their comparative merits. Reasonable alternatives should meet the project purpose and need. What constitutes a reasonable range of alternatives depends on the nature of the proposal and the facts in each case.

After consideration of the alternatives presented in the EIS, the federal lead agency adopts the EIS and makes a decision on the proposed action. A Record of Decision (ROD) is then prepared to explain the agency's course of action. The ROD contains:

- An explanation of the decision on the proposed action
- Factors considered in making the decision
- Alternatives considered and the environmentally preferred alternative
- Any adopted mitigation measures or reasons why mitigation measures were not adopted
- A monitoring an enforcement program for those mitigation measures that were adopted

The draft EIR/EIS presented detailed information on two main alternatives (50 cfs and 150 cfs pump station). Since the 50 cfs alternative has been selected as the preferred project, only information on the 150 cfs pump station is presented in this section of the Final EIR/EIS. Some of the other alternatives (for example, Native Fish in Blackrock) are discussed in less detail because they constitute a specific portion of the project with isolated impacts.

11.2 EVALUATION OF NO PROJECT ALTERNATIVE (CEQA AND NEPA)

Under the No Project Alternative, both the adverse and beneficial impacts of the LORP would not occur. The enhancement of the aquatic, wetland, and riparian habitats along the river and at Blackrock Waterfowl Area would not occur, nor would any potential habitat enhancements in the Delta Habitat Area (if any). The proposed modification of grazing practices to improve rangelands and protect riparian habitat on LADWP leases would not occur. As a consequence, the poor habitat conditions along the Lower Owens River would persist.

This alternative would avoid the significant impacts of the proposed project – short-term water quality degradation during the initial river rewatering; and potential fish kills during the initial re-watering. However, overall, this alternative would not provide the environmental benefits of the LORP and would therefore not be environmentally superior to the proposed project.

Additionally, this alternative is considered infeasible, as it would be contrary to the MOU and Court Order mandating LADWP to implement the LORP. Since the MOU and the LORP Plan serve as mitigation for previous groundwater pumping impacts under the 1991 EIR, selecting the No Project Alternative would not provide mitigation for those impacts as required.

11.3 EVALUATION OF CEQA ALTERNATIVES

The proposed project would result in significant, unavoidable impacts (Class I) that cannot be mitigated to less than significant levels as summarized below. Where feasible, mitigation measures have been identified to reduce the magnitude of the adverse effects (see Sections 4 through 10).

Alternatives that may avoid or reduce the significant impacts are described below, including an assessment of their feasibility. A summary of the CEQA alternatives is provided in Table 11-1.

TABLE 11-1
SUMMARY OF CEQA ALTERNATIVES

Significant Impact of the Proposed Project (Class I)	Alternatives to Avoid or Reduce the Impact	Feasible? (as Determined by Lead Agencies)	Does the Alternative Have Other Significant Impacts?
Water quality degradation and fish kills during initial flows (two impacts)	Release Regime 1 - Gradual Baseflows and Deferred Seasonal Habitat Flows	No. While technically feasible t, not environmentally superior to the proposed project and infeasible due to delay in establishment of 40 cfs baseflows	No. However, this alternative would further delay achievement of LORP goals.
	Release Regime 2 - Begin with Seasonal Habitat Flows to Flush the System (in July following completion of the pump station)	No. While technically feasible, not environmentally superior to the proposed project and infeasible due to potential delay in establishment of 40 cfs baseflows	Possible greater water quality impacts and fish kills during the first seasonal habitat flow release, but potentially reduced water quality impacts and fish kills during establishment of the 40-cfs baseflow
	Release Regime 3 - Delay Releases for Baseflows Until Winter	No. While technically feasible, not environmentally superior to the proposed project and infeasible due to delay in establishment of 40 cfs baseflows	Possible greater water quality impacts and fish kills during first seasonal habitat flow release and would delay establishment of 40 cfs baseflows thus delaying achievement of LORP goals

11.3.1 Water Quality Degradation and Fish Kills (Two Class I Impacts)

Summary of Proposed Release Regime and Impacts

As described in Section 4.4.3, the proposed baseflow and seasonal habitat flows may cause short-term water quality degradation along the Lower Owens River downstream of Mazourka Canyon Road. Flows could interact with organic sediments that have accumulated over time in the river channel, causing a depletion of oxygen, and a possible increase in hydrogen sulfide and ammonia. Although it is anticipated that water quality conditions during baseflows would improve, there are no reliable estimates of the potential duration of adverse water quality conditions. As described in Section 4.4.3, the short-term degradation of water quality along the river could also cause fish kills along the river downstream of Mazourka Canyon Road.

Inyo County (Jackson, 1994) and Ecosystem Sciences (Technical Memorandum No. 11, no date) recommended slow and gradual ramping of the initial releases to achieve the baseflows in order to reduce the magnitude of water quality and fish kill impacts. Ecosystem Sciences (Technical Memorandum No. 11, no date) originally envisioned that the slow ramping to 40 cfs (designed to minimize water quality impacts) would require up to 3 years.

The proposed flow release regime is summarized below and is described in detail in Section 2.3.5. Under Phase 1, LADWP would release water from the River Intake upon the completion of channel clearing below the River Intake, the modification of the River Intake structure, the installation of 14 temporary flow measuring stations, installation of culverts, and completion of any other channel improvements. This is estimated to occur approximately 6 months after the completion of the environmental review process and project permitting. At that time, LADWP would release sufficient water from the River Intake to create a continuous flow in the river from the River Intake to the Delta. During this phase, flows throughout the Lower Owens River would be the same as have occurred under past and existing practices in the currently wet reach of the river, as indicated by the monthly average flows at Keeler Bridge shown in Chart 4-4. Phase 2 releases would begin at the River Intake as soon as the pump station is operative, which is required per the February 2004 Stipulation and Order to occur by April 1, 2006.

Under the proposed release regime, the first seasonal habitat flow will be released in the winter immediately following the completion of the pump station construction; this is intended to reduce the potential for substantial decreases in dissolved oxygen and adverse effects on fish health by releasing the first high flow when temperatures are low. The magnitude of the first seasonal habitat flow will be 200 cfs at peak flow, regardless of forecasted runoff. After the first seasonal habitat flow, subsequent annual seasonal habitat flows will be released in May or early June.

The Draft EIR/EIS presented three alternative release regimes as described below. These three alternatives were identified to reduce the impacts of the proposed release regime as described in the Draft EIR/EIS. However, the proposed release regime as summarized above and described in Section 2.3.5 of this Final EIR/EIS has been modified from the release regime described in the Draft EIR/EIS in the following manner:

- The first seasonal habitat flow will be released in the winter (as opposed to May or early June).
- The Phase 2 baseflow release will begin in March (at the latest) (as opposed to July).

The proposed release regime as described in this Final EIR/EIS is an amalgamation of Alternative Initial Release Regimes 2 (Begin with a Seasonal Habitat Flow to Flush the System) and 3 (Delay Releases for Baseflows Until Winter). The proposed release regime is expected to have less impacts on water quality and fish health than either of these two alternative release regimes (and the release regime presented in the Draft EIR/EIS) because the increases in flows will occur during the winter when temperatures are low. Therefore, Alternative Release Regimes 2 and 3 are no longer relevant as alternatives that are designed to reduce significant impacts of the proposed project, but are described below for completeness. In contrast, Alternative Initial Release Regime 1 is still relevant and would be expected to reduce water quality and fish health impacts as compared with the proposed release regime.

Alternative Initial Release Regime 1 – Gradual Baseflows and Deferred Seasonal Habitat Flows

The objective of this alternative is to introduce baseflows in a gradual manner over 2 to 3 years to reduce water quality and fish impacts. Under this alternative, the 40-cfs baseflow would be established along the river in accordance with the originally proposed two-phased approach over a 2- or 3-year period. A longer ramping period would allow time to slowly increase flows over a longer period of time, which may allow more time for water quality conditions to equilibrate, as well as allow more time to monitor and adjust flows from the River Intake and spillgates to attempt to reduce water quality impacts.

Under this alternative, the Phase 1 flows in the river would be initiated once construction activities in the river channel at the pump station have been completed. At that time, water would be gradually released from the River Intake at 1 to 5 cfs increments daily until a 20-cfs flow has been established throughout all reaches in the river. If adverse water quality conditions are observed, releases from the River Intake would be held steady or reduced in an attempt to improve water quality. In addition, flows downstream of the River Intake would be augmented with water released from the spillgates (to provide fish with refuge areas of higher quality water).

Once a 20-cfs flow was been achieved along all reaches, Phase 2 releases would commence from the Alabama spillgates in 1 to 5 cfs increments daily until the river below the Alabama spillgates has a steady flow of 40 cfs. The releases from Alabama Gates would only affect the lower 17.5 miles of the 62-mile-long Lower Owens River. This represents about 46 percent of the wetted reach of the river. Hence, approximately 54 percent of the currently wetted reach would not be affected by these higher flows, and as such, would not be at risk if there were adverse water quality and fish impacts.

Once a 40-cfs flow has been established between Alabama spillgates and the pump station, releases from the River Intake would be increased above 20 cfs in approximately 1 to 5 cfs daily increments as described above until the entire river has a continuous 40-cfs flow. The releases from the Alabama spillgates would be gradually reduced until all flows are derived from the River Intake, unless it is necessary to use flows from spillgates to maintain the 40 cfs and/or reduce water quality and fish impacts.

Under this alternative, the 40-cfs baseflow would not be established until water quality conditions are deemed acceptable by the Inyo/Los Angeles Technical Committee, but no later than 36 months after the initial flows. Seasonal habitat flows would be deferred until the second or third year after the initiation of flows, as specified by the Inyo/Los Angeles Technical Committee based on water quality conditions observed during baseflows.

This alternative would not result in any new impacts compared to the proposed project, nor would it increase the magnitude or extent of any impacts associated with the proposed project. It is unknown to what extent this alternative would avoid or reduce impacts to water quality or fish compared to the proposed project, but it is expected that there would be water quality benefits.

Although this alternative is technically feasible, it is not considered environmentally superior to the proposed project since it would result in a delay in the establishment of the 40-cfs baseflow in the river compared to the proposed project. Additionally, this alternative would not be consistent with the February 2004 Stipulation and Order which requires that the baseflow of 40 cfs be achieved in the river no later than April 1, 2006. Since this delay in the implementation of the LORP would continue the degraded state of the river ecosystem and delay achievement of the environmental benefits expected under LORP, this alternative would delay attainment of project objectives. It is therefore rejected as inconsistent with the Court Order, not environmentally superior to the proposed project, and therefore not proposed for adoption.

Alternative Initial Release Regime 2 – Begin with Seasonal Habitat Flows to Flush the System

The objective of this alternative is to flush the river of vegetative debris and organic sediments (mostly located downstream of Mazourka Canyon Road), breach beaver dams, and create openings in tule stands in order to prepare the river for the baseflow. This alternative is based on the assumption that the flushing effect of higher flows at the beginning of the project will reduce the duration of subsequent water quality impacts and fish kills by mobilizing and possibly removing organic sediments from the river system. In addition, this alternative is based on the assumption that a flood-like disturbance to the river corridor may stimulate natural vegetation succession processes (i.e., colonization by willows) more quickly.

Under this alternative, the initial baseflows would begin in two phases as defined under the proposed project However, seasonal habitat flows of 200 cfs would be established immediately following the completion of the pump station (currently estimated to be approximately Summer 2006). The seasonal habitat flows would be established along the entire Lower Owens River using a combination of the River Intake and various spillgates, if necessary.

The 40-cfs baseflow would be established along the entire river immediately after the end of the seasonal habitat flows, using a combination of the River Intake and various spillgates to manage water quality conditions.

This alternative may cause more severe water quality impacts and fish kills during the initial release period compared to the proposed project since the flushing flow would occur in the summer (i.e., when temperatures are higher) and may increase the potential for substantial decreases in dissolved oxygen and adverse effects on fish health. However, there is potential for the flushing action of the first seasonal habitat flow to reduce the duration of the water quality and fish impacts during the initial establishment of the 40-cfs baseflow. However, the ecological benefits of this alternative cannot be assessed based on available data and analytic tools. There is much uncertainty about the magnitude and duration of water quality impacts and fish kills under all release regimes.

Although this alternative is technically feasible, it is not considered environmentally superior to the proposed project since it may cause more severe water quality impacts and fish kills that the proposed project. Additionally, this alternative might not be consistent with the February 2004 Stipulation and Order which requires that the baseflow of 40 cfs be achieved in the river no later than April 1, 2006. It is therefore rejected as inconsistent with the Court Order, not environmentally superior to the proposed project, and therefore not proposed for adoption.

Alternative Release Regime 3 – Delay Releases for Baseflows Until Winter

Under this alternative, releases to establish the 40-cfs baseflow would occur in the first winter following completion of the pump station when water and air temperatures are lower compared to schedule under the proposed release regime. The objective of this alternative is to establish the baseflow in the river when temperatures are cooler, which could reduce the magnitude of potential impacts to water quality and fish. The significant water quality and fish impacts described in Section 4.4.3 may not be avoided under this alternative release regime, but the magnitude of the impact (i.e., the extent of water quality degradation, the length of poor water quality conditions, and the magnitude of fish kills) may be less than under the proposed project.

To reduce the water quality and fish impacts under the proposed project, the initial release to establish the 40-cfs baseflow under this alternative would begin in the first November following completion of the pump station. The releases would continue in a gradual and progressive manner, with the objective of establishing the 40 cfs along the entire river by the following April 1st. During the period of November to April, LADWP would conduct the water quality monitoring described in Section 2.3.5.2. In addition, releases would be made from spillgates to reduce water quality and fish impacts, as described in Section 2.3.5.2. The initial seasonal habitat flow will be released to the river in late May or early June 1 year after the establishment of the 40 cfs baseflow.

As compared with the proposed project, this alternative would have similar water quality impacts associated with establishment of baseflows (baseflows would be established in the cooler months) but may exacerbate impacts from the first seasonal habitat flow (since it would be released in May or June instead of in winter). It would also delay achievement of LORP goals since establishment of baseflows would be later than under the proposed project.

Although this alternative is technically feasible, it is not considered to be environmentally superior to the proposed project. Additionally, this alternative would not be consistent with the February 2004 Stipulation and Order which requires that the baseflow of 40 cfs be achieved in the river no later than April 1, 2006. It is therefore rejected as inconsistent with the Court Order, not environmentally superior to the proposed project, and therefore not proposed for adoption.

11.3.2 CEQA Alternatives Summary

Based on the discussion above in Sections 11.2 and 11.3.1, the proposed project is identified as the environmentally superior alternative.

11.4 EVALUATION OF NEPA ALTERNATIVES

Under NEPA, reasonable alternatives that meet the project purpose and need should be addressed in the EIR/EIS. A variety of alternative approaches to meeting the MOU goals were identified in the letters of comment on the 1999 draft LORP Plan and the Notice of Preparation and Notice of Intent for the EIS/EIR. Based on these comments, there appear to be alternative management actions that achieve the MOU goals, and that possibly ensure a higher probability of success and result in greater habitat and species enhancements. They may or may not be considered necessary to achieve the MOU goals. They represent alternatives that should be considered in the adoption of the project to the extent that the lead and responsible agencies find them desirable and feasible based on funding, logistics, and institutional arrangements. A summary of the NEPA alternatives is presented below in Table 11-2. None of these alternatives are designed to reduce identified significant impacts of the LORP.

TABLE 11-2
SUMMARY OF NEPA ALTERNATIVES

Alternative	Is it Feasible? (as Determined by Lead Agencies)	Does it *Avoid or Lessen* Significant Impacts of the Proposed Project	Does it Involve Any *New* Significant Impacts?
150 cfs Pump Station – Section 11.4.1	Yes	No	No
Delta Modifications – Section 11.4.2	No	No	Yes, significant wetland losses due to berm construction in the Delta
Alternative Releases for the Seasonal Habitat Flows – Section 11.4.3	Yes	No	Possibly, there is a higher potential for flows being diverted outside the Delta through the overflow channel. This impact could range from significant and adverse to beneficial.
Alternative Pulse Flow Regimes for the Delta – Section 11.4.4	Yes	No	No
Cowbird Trapping – Section 11.4.5	Yes	No	No
Native Fishes in Blackrock – Section 11.4.6	No	No	Yes, possible high mortality of native fishes during transition from wet to dry cycles.
Modified Flooding Regime in Blackrock – Section 11.4.7	Yes	No	No
Alternative Sediment Stockpiling Sites – Section 11.4.8	Yes	(Since publication of the Draft EIR/EIS, the sediment stockpile area has been changed to two upland locations to avoid impacts to the wetland located in the oxbow area.)	No

11.4.1 150 cfs Pump Station

The Draft EIR/EIS (November 2002), described the following two options for the capacity of the proposed pump station: 150 cfs (referred to as Option 1 in the Draft EIR/EIS) and 50 cfs (referred to as Option 2 in the Draft EIR/EIS). As described in Sections 1.1 and 2.4 of this Final EIR/EIS, LADWP, in consultation with Inyo County and the other MOU parties, now proposes to implement the 50-cfs pump station option. In the Draft EIR/EIS, Sections 5.0 (Diversion, Pump Station, Power Line, and Road Surfacing) and 6.0 (Delta Habitat Area) described the impacts associated with both the 50-cfs and 150-cfs pump station options. For the Final EIR/EIS, these sections have been revised to describe only the impacts associated with the proposed project (i.e., the 50-cfs pump station option), and the discussions of impacts associated with the 150-cfs pump station option are presented in this section.

The 150 cfs pump station would differ from proposed 50 cfs pump station as follows:

- There would be a total of eight pumps, each with a capacity of approximately 20 cfs (compared to four pumps, each with a capacity of approximately 17.5 cfs). The maximum flow rate leaving the pump station would not exceed 150 cfs.
- The sump and pump station building would be slightly larger approximately 66 by 72 feet (compared 35 by 69 feet).
- The air chamber would be larger.
- A smaller quantity of water would by-pass the pump station and reach the Delta during seasonal habitat flows.

Although this alternative would have a larger sump and pump station building, the facility yard would be the same (about 1 acre in size). The electrical transformer, diversion structure, roads, temporary construction zone, 400-foot long pipeline, and sediment basin would also be the same as the 50-cfs pump station facility. Construction of this alternative would be essentially the same as the 50-cfs pump station facility. It would have the same phasing, but possibly a longer overall timeframe (by several weeks only). Although the power requirements for this alternative would be greater than the proposed facility, the same new power line would be required. Therefore, the temporary and permanent impacts from construction of the pump station and associated facilities (e.g., diversion, roads, sediment basin, and power line) would be the same and as described in Section 5.0 for both the proposed project and the 150-cfs pump station alternative.

Operation of a 150-cfs pump station would be similar to the 50 cfs capacity pump station. The water surface elevations in the forebay during operations under both the baseflow and seasonal habitat conditions would be same under the 150 cfs pump station. Hence, the forebay would inundate the same acreage as the proposed project and affect the same vegetation types, as summarized in Table 5-2.

However, the quantity of water that would be bypassed to the Delta Habitat Area during the seasonal habitat flows would be less under the 150-cfs pump station alternative than under the proposed project. The potential impacts on the aquatic and wetland habitats in the Delta Habitat Area under the 150-cfs pump station alternative are described in the following subsections; Sections 11.4.1.1 and 11.4.1.2 were moved from Sections 6.3.1 and 6.3.2 of the Draft EIR/EIS. The text presented below has been modified to delete some of the discussion redundant with Section 6.3 and to make minor editorial or factual corrections; however, no change has been made to the content of the impact discussions or the impact conclusions.

As described in the introductory paragraphs to Section 6.3, there are many uncertainties in predicting the effects of the proposed flows on wetlands in the Delta due to an incomplete understanding of the complex ecological and hydrologic processes. Therefore, reasonable differences of opinion exist amongst technical experts interpreting the same data and are described below.

11.4.1.1 Impact Assessment No. 1 for 50 cfs Pump Station (Prepared by Ecosystem Sciences and White Horse Associates)

Baseflow and Pulse Flow Impacts

Under the 150-cfs pump station alternative, the impacts of the baseflows and pulse flows to the Delta will be identical to those of the proposed project (50-cfs pump station) as discussed in Section 6.3.1.

Seasonal Habitat Flow Impacts

Without considering channel losses, seasonal habitat flows that will bypass the 150 cfs pump station to the Delta Habitat Area are anticipated to range 20 to 50 cfs for a day or two every other year on average. The impacts of seasonal habitat flows are anticipated to be similar to those discussed for pulse flows (see Section 6.3.1), but, given the short duration, of lesser magnitude.

Impact Summary Related to Delta Habitat Area

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), LADWP will have met and exceeded the MOU goals of maintaining or enhancing 325 acres of existing Delta habitats. Notwithstanding this position, per LADWP's analysis, the proposed flow regime for the Delta Habitat Area is expected to enhance and maintain the Delta conditions existing at the time of the commencement of flows to the Delta under the LORP. Thus, LADWP's goal will be to enhance and maintain the Delta conditions.

For purposes of the EIR/EIS, impacts were assessed relative to 2000 conditions (White Horse Associates 2004). In this study it was estimated that approximately 831 acres of water and vegetated wetlands existed in 2000. While LADWP is not obligated to maintain and enhance these additional acres, the proposed water budget is expected to result in further expansion of wetlands relative to 2000 conditions. Wetlands expansion is expected to continue until evapotranspiration demands exceed baseflow and the expansion of wetlands levels off. Further wetland expansion may occur in response to seasonal pulse flows. Vigorous wetland vegetation will result in more efficient use of available water (e.g., increase transpiration and reduce evaporation). No impact to the extent of water and vegetated wetland for 2000 conditions is anticipated.

The MOU specifies "riparian areas and ponds" will be enhanced and maintained "to the extent feasible." Given static conditions, all open water in the Delta Habitat Area would eventually be converted to marsh. But conditions in the Delta Habitat Area since 1944 (see Section 6.1.3) have not been static. Shifting dunes and beaver are important dynamic forces that create new areas of open water that will eventually revert to vegetated wetland. Intensification of these forces is expected to cause a short-term shift towards more open water and less vegetated wetlands. Reduction of these forces is expected to cause a long-term shift towards less open water and more vegetated wetlands. However, please note that implementation of LORP is not expected to affect the extent, distribution or dynamics of dunes. At this time, beaver management is not proposed in the Delta Habitat Area, but is a potential adaptive management measure as described in Section 2.10.5.

Anticipated beneficial impacts (Class IV) resulting from implementation of baseflow include: (1) conversion of unvegetated playa to vegetated wetland; and (2) conversion of drier wetland types to wetter vegetated wetland types and open water. **Anticipated adverse, but insignificant, impacts (Class III)** resulting from implementation of baseflow include the accelerated loss of vertical structure associated with the riparian forest wetland type. Riparian forest developed under historic seasonally flooded conditions and has been reduced to small areas of decadent, dying and dead trees that are permanently flooded or saturated.

11.4.1.2 Impact Assessment No. 2 for 150 cfs Pump Station (Prepared by URS Corporation)

Amount of Water Reaching the Delta From Proposed Baseflows and Pulse Flows

The baseflows and pulse flows under the 150 cfs pump station alternative would be identical to the proposed 50 cfs pump station. Hence, the flows to the Delta under this alternative would also be about 35 percent less than under current conditions, as described in Section 6.3.2.1.

Potential for Seasonal Habitat Flows to Reach the Delta

An estimate of the seasonal habitat flows (baseflows also reach the pump station) that would reach the pump station based on a 200 cfs release at the River Intake (during average and above average flow years) is provided in Table 11-3 (based on a moderate channel loss rate estimate; see Sections 6.3.2.2 and 10.5) and in Table 11-4 (for a lower channel loss rate estimate; see Sections 6.3.2.2 and 10.5). These calculations indicate that seasonal habitat flows above the 40 cfs baseflow would occur at the pump station for 5 to 10 days. It is assumed that a minimum of 5.3 cfs would be by-passed from the pump station to the Delta. With a 150 cfs pump station, no seasonal habitat flows would be bypassed to the Delta based on a moderate channel loss rate estimate of 1 cfs per mile, as shown in Table 11-3.

TABLE 11-3
ESTIMATE OF SEASONAL HABITAT FLOWS THAT REACH THE 150 CFS PUMP STATION AND THE DELTA WITH A 200 CFS RELEASE AT THE RIVER INTAKE ONLY
MODERATE CHANNEL LOSS ASSUMPTION

	Flows at the River Intake (Flows Prior to Day 1 are 40 cfs)				Flows to the Delta Associated with Seasonal Habitat Releases	
Day	Flow	Seasonal Flows Above 40 cfs	Seasonal Flows that Reach the Pump Stn After 62 cfs Channel Loss*	Total Flows at 150 cfs Pump Stn	Flow cfs**	Acre-Feet above Baseflows ***
1	50	10	0	40	5.3	0
2	63	23	0	40	5.3	0
3	79	39	0	40	5.3	0
4	99	59	0	40	5.3	0
5	124	84	22	62	5.3	0
6	155	115	53	93	5.3	0
7	200	160	98	138	5.3	0
8	160	120	58	98	5.3	0
9	128	88	26	66	5.3	0
10	102	62	0	40	5.3	0
11	82	42	0	40	5.3	0
12	66	26	0	40	5.3	0
13	53	13	0	40	5.3	0
14	40	0	0	40	5.3	0
Total quantity of water that reaches the Delta (acre-feet) =						0

1 cfs for 1 day = 1.98 acre-feet. * The estimate of channel loss is 1 cfs per mile.
** Minimum daily baseflow to the Delta assumed to be 5.3 cfs. *** Does not include volume of water associated with 5.3 cfs baseflow

Using a lower channel loss rate estimate (0.35 cfs per mile), flows of up to 28 cfs would be by-passed to the Delta for one day (about 45 acre feet, not including the 5.3 cfs baseflows), as shown in Table 11-4. These bypass flows would occur in average and above average years, or about every other year.

TABLE 11-4
ESTIMATE OF SEASONAL HABITAT FLOWS THAT REACH THE 150 CFS PUMP STATION AND THE DELTA WITH A 200 CFS RELEASE AT THE RIVER INTAKE ONLY – LOWER CHANNEL LOSS ASSUMPTION

	Daily Average Flows at the River Intake (Flows Prior to Day 1 are 40 cfs)				Flows to the Delta Associated with Seasonal Habitat Releases	
Day	Flows	Seasonal Flows Above 40 cfs	Seasonal Flows that Reach the Pump Stn After 22 cfs Channel Loss*	Total Flows at 150 cfs Pump Stn	Flows cfs**	Acre-Feet above Baseflows ***
1	50	10	0	40	5.3	0
2	63	23	1	41	5.3	0
3	79	39	17	57	5.3	0
4	99	59	37	77	5.3	0
5	124	84	62	102	5.3	0
6	155	115	93	133	5.3	0
7	200	160	138	178	28	45
8	160	120	98	138	5.3	0
9	128	88	66	106	5.3	0
10	102	62	40	80	5.3	0
11	82	42	20	60	5.3	0
12	66	26	4	44	5.3	0
13	53	13	0	40	5.3	0
14	40	0	0	40	5.3	0
Total quantity of water that reaches the Delta (acre-feet)=						45

1 cfs for one day = 1.98 acre-feet. * The estimate of channel loss is 0.35 cfs per mile. ** Minimum daily baseflow to the Delta assumed to be 5.3 cfs. *** Does not include volume of water associated with 5.3 cfs baseflow.

Ecological Effects of Reduced Flows to the Delta

The magnitude and significance of the impacts of the proposed flow regime to the Delta on aquatic and wetland habitats are discussed in the following subsections based on the previous technical analyses concerning the amount of water discharged to the Delta, the channel capacity, and the potential for water spreading.

Mechanisms for Maintaining and Enhancing Delta Wetlands and Aquatic Habitats

In general, the desired benefits to habitats and habitat indicator species in the Delta due to new flow management would be achieved by one or more of the physical and biological mechanisms listed below. The occurrence and relative importance of each mechanism is directly related to the amount and timing of flows to the Delta Habitat Area.

- Mechanisms to Expand Wetlands. Properly managed flows could spread across areas that are not typically inundated. These flows could infiltrate or evaporate, and provide fresh water to the root zone of plants to support new growth or fill pore space to prevent upwelling of saline groundwater, which inhibits plant growth. These conditions may develop new wetlands, if conditions are favorable, as well as expand existing wetlands along their margins. An increase in vegetated wetlands would provide more opportunities for shelter, foraging, and nest sites for most of the waterfowl and riparian breeding birds that use the Delta.

- Mechanisms to Increase Wetland Growth. Properly managed flows could facilitate greater plant productivity by providing more volume of fresh water in the root zone, and/or a longer duration of available water to extend the growing season where it is limited by water. Wetlands in the floodplain of the Delta and riparian habitats along the east and west branches would benefit. An increase in wetland and riparian productivity would provide more opportunities for shelter, foraging, and nest sites for most of the waterfowl and riparian breeding birds that use the Delta.

- Mechanisms to Expand Aquatic Habitat. Properly managed flows could spread across areas that are not typically inundated, creating seasonal or semi-permanent ponds. The flows may also create more open water area within the east and west branches due to higher water surface elevations, and in the brine transition zone at the southern end of the Delta Habitat Area. An increase in open water in the channels and in isolated ponds would directly benefit various shorebirds and waterfowl that use the Delta, including the snowy plover, by creating more food and water.

- Mechanisms to Promote Sustainability. Properly managed flows could increase habitat diversity by causing more physical disturbance in the Delta channels due to higher velocities, more overbank flooding and spreading, and disturbance to beaver dams along the river upstream of the Delta. Increased physical disturbance would likely increase plant recruitment and succession, which in turn would increase sustainability of the ecosystem.

The Great Basin Unified Air Pollution Control District (GBUAPCD) has conducted studies on shallow groundwater conditions and vegetation response to groundwater with varying depths and salinities. In addition, the GBUAPCD has conducted several studies on shallow groundwater conditions in and near the Delta. Through these studies, the GBUAPCD has postulated the following explanation for groundwater and wetland conditions in Owens Lake.

Owens Lake is underlain by a shallow groundwater aquifer that is highly saline. It is recharged from winter runoff, and as such, rises each winter. The shallow groundwater is too saline for plant growth. Hence, once it reaches the root zone, plant growth is precluded. In most areas of the lake, there is a gradient of increasing salinity from the groundwater to the surface due to capillary action from evaporation. The Delta contains a freshwater “lens” that occurs above the shallow saline groundwater that is maintained by the discharges to the Delta from the Owens River. The freshwater lens essentially floats above the saline groundwater due to its lower density, and mixing appears to be minimum. In contrast to other areas of Owens Lake, salinity decreases from the depth to the ground surface due to this freshwater lens. Plants thrive in these areas because they are protected from the highly saline groundwater. If the freshwater lens is depleted during the growing season and not replenished prior to the spring runoff, plants rooted in these areas will be exposed to potentially toxic levels of saline groundwater as they break dormancy in March and April.

Based on the above observations, it appears that spreading fresh water in the sparsely vegetated floodplain of the Delta would generally contribute to wetland growth in the Delta by filling pore spaces in the upper soil with fresh water that can be exploited by colonizing wetland plants, and by creating positive pressure from freshwater infiltration that could displace saline groundwater around the margins of the Delta. In general, any additional water to the Delta has the potential to benefit wetlands (by improving soil salinity conditions) and/or birds (by maintaining aquatic habitat and associated invertebrates).

Effect on Existing Aquatic and Wetland Habitats

Aquatic habitats and wetlands in the Delta are directly affected by the amount and timing of flows to the Delta. For these habitats to be maintained in their current conditions, the proposed flow regime to the Delta must: (1) be similar to current and recent historic flows; or (2) provide water resources in different, but more efficient manner compared to the current regime.

As described above, the proposed bypass flows to the Delta would discharge about 35 percent less water to the Delta than under current release regimes unrelated to the LORP. Under current conditions (i.e., the period 1986-2001), 7,819 acre-feet of water (median annual flow) is discharged to the Delta, following a pattern of low flows in the summer and higher flows in the winter (Chart 6-4). Under the proposed initial release regime, there would be a lower baseflow year-round and four discrete 5 to 10-day periods of higher flows. The total amount of water to be released to the Delta under the proposed release regime would be about 5,140 acre-feet.

The reduction in the overall amount of fresh water discharged to the Delta may result in adverse impacts to existing aquatic habitats and wetlands. The lower flows could reduce the total volume of fresh water in the root zone, which is critical in maintaining plant productivity in this highly saline soil environment by providing positive pressure in the upper soil to prevent upwelling of highly saline groundwater. The overall reduction in fresh water in the Delta could also reduce the amount of water available for plant uptake, thereby reducing the growth period compared to current conditions. Finally, the reduction in the overall amount of water discharged to the Delta may reduce the water depth in channels and the amount of surface water in the brine transition zone, which in turn would reduce aquatic habitat for fish, invertebrates, and water-associated birds. The reduction in water surface elevation in the Delta channels could also reduce the extent of lateral groundwater infiltration that supports wetlands along the margins of the channels.

The magnitude of potential adverse impacts of a net reduction in water discharged to the Delta on the condition of existing habitats cannot be accurately predicted. The amount and timing of flows under the proposed flow regime are substantially different compared to the current regime, and as such, an ecological effect (positive or negative) is anticipated. The proposed pulse flows follow the current seasonal flow pattern – that is, low flows in the summer, increasing through the winter, then decreasing in the spring (Chart 6-4). This flow pattern may or may not be optimal for aquatic habitats and wetlands. For example, the proposed lowest pulse flow would occur in the summer (see Chart 6-4) at the time when plants exhibit the highest water demand. In contrast, the high pulse flow in the early winter may fill depleted pore spaces in the soil with freshwater that can be readily used by plants when they break dormancy in the early spring.

It is important to recognize that the seasonal pattern of existing flows is not designed to maintain or enhance habitats in the Delta. The pattern shown in Chart 6-4 is a result of upstream releases for irrigation purposes and channel losses prior to reaching Keeler Bridge. Hence, the lower flows to the Delta in the summer are likely due to high upstream water demand, and should not be considered an optimal flow pattern for maintaining and enhancing wetlands in the Delta. Alternative flow regimes designed specifically to benefit wetlands are described in Section 11.4.4.

There are no available data or analytic tools to definitively conclude that the revised regime would maintain existing aquatic and wetlands habitats. In contrast, there is a reasonable basis for postulating an adverse effect based on a substantial net reduction in flows to the Delta. Hence, absent compelling evidence to the contrary, it is concluded that a substantial reduction in the total amount of water released to the Delta may have an adverse ecological impact, even in light of the four seasonal pulse flows designed for ecological purposes. The proposed flow regime could possibly reduce the extent of existing aquatic and wetland habitats, and the productivity of vegetated wetlands. **While there may be a possibility that an adverse impact would not occur under the proposed release regime, it is considered prudent to provide a conservative impact assessment and identify this impact as potentially significant and unmitigable (Class I).** Mitigation measures and alternatives to reduce the magnitude of this impact are described below.

As described above, the seasonal habitat flows under the proposed release regime are not predicted to bypass the 150 cfs pump station and reach the Delta, or if the flows were to be sufficient to bypass the pump station, they would only occur for a single day. Hence, the proposed seasonal habitat flows do not represent an additional source of water for the Delta Habitat Area to offset the reduction under the proposed initial baseflow and pulse flow regime.

It should be noted that a large fraction of the freshwater flows to the Delta pass through to the brine pool. Hence, one can postulate that existing flows can be reduced without adverse ecological effects because not all of these flows may contribute to aquatic and wetland habitats. For example, Ecosystem Sciences (Tables for the Addendum to Technical Memorandum 8, June 2000) estimated that water demand from existing wetlands in the Delta (as of 1996) to be about 3,366 acre-feet per year, well below the approximately 8,000 acre-feet per year discharged to the Delta under current conditions. Hence, some of the water currently discharged to the Delta may not have any ecological consequences within the designated boundary of the Delta Habitat Area.

An alternative viewpoint is that water that is not consumed by plants in the Delta has other benefits, which may not be obvious. For example, maintaining water levels in the Delta channels can provide positive groundwater pressure in areas adjacent to the channels, thereby increasing the height and volume of fresh water to support wetland plants in adjacent areas. The water in channels provides aquatic habitat for invertebrates and birds. The surface area of this habitat and the quality of the water could be adversely affected by a reduction in flow (and the associated reduction in water depth).

The above described impact to Delta aquatic habitats and wetlands could be reduced by increasing the magnitude of the proposed baseflows and pulse flows, as well as modifying the number and timing of the pulse flows. The MOU specifies an average annual flow of 6 to 9 cfs. The proposed initial flow regime is an average annual flow of 7.1 cfs, which represents 5,140 acre-feet per year. If the baseflow and pulse flows were increased to an average annual flow of 9 cfs, a total of 6,516 acre-feet would be discharged to the Delta. This amount of water is still 1,303 acre-feet per year less than the current average annual discharge of about 11 cfs (7,819 acre-feet), and as such, may not be sufficient to avoid significant impacts in the Delta. The modifications, described in Mitigation Measure D-1 (see below), would reduce the magnitude of the impact; however, the residual impact may remain significant.

The impacts to aquatic and wetland habitats due to the reduction in overall water to the Delta could also be mitigated in part, by increased flows to the Delta during the seasonal habitat flows. An alternative to provide more water to the Delta from seasonal habitat flows is described in Section 11.4.3. Under this alternative, supplemental water would be released from spillgates along the river during the seasonal habitat flows to offset channel losses, and ensure that the target flows are achieved at the pump station. This alternative would substantially increase the average annual amount of water discharged to the Delta compared to the proposed release regime, and possibly avoid this significant impact if coupled with a 50 cfs pump station. See Section 11.4.3 for a detailed discussion.

Potential for Bypass Flows to Be Conveyed Outside the Delta

The river channel downstream of the pump station is clogged with cattails and bulrushes, facilitated by the low gradient of the river and the presence of several beaver dams. To determine if there is sufficient capacity in this channel to convey the seasonal habitat flows that would reach the Delta, LADWP measured six cross sections between the pump station site and the "Y" where the east and west branches diverge (Figure 6-1). The channel width ranges from 200 to 300 feet. The channel depth ranges from 2 to 4 feet.

Ecosystem Sciences conducted a hydraulic modeling analysis (HEC-RAS model) of this reach of the river (using measured cross sections at the transects described above) to determine channel capacity and water surface elevation. The analysis was completed using various flows (7.2, 25, 50, and 150 cfs) to represent different possible by-pass flows to the Delta. The modeling assumed a range of gradients and roughness coefficients in order to represent current channel conditions with dense vegetation and a cleared channel. The modeling results were presented by Ecosystem Sciences (Appendix E).

There is a low-lying area along the western bank of the river channel, about 900 feet upstream of the "Y" (Figure 6-1). The bank appears to have been manually breached to allow flows from the river channel to move to the west, possibly to enhance cattle grazing. This overflow point is about 20 to 30 feet wide, and about 3 to 4 feet deep. It appears that periodic high flows are conveyed through the breach to form the overflow channel. Under most flows, it appears that the overflow channel only receives seepage flows. However, when the water surface elevation is increased in the river, due to higher flows or effects of beaver dams, surface water spills through the overflow point into the overflow channel. The water surface elevation during a site survey in August 2001 was only 1 foot below the top of the breach, when flows in the river were estimated to be 5 to 10 cfs.

The modeling results by Ecosystem Sciences were designed to identify what magnitude of flows would be likely to overtop the breach in the bank, and be conveyed into the overflow channel. The results are summarized below in Table 11-5. These modeling results indicate that flows between 25 and 50 cfs would overtop the bank and enter the overflow channel. Under the 150 cfs pump station alternative, no seasonal habitat flows would reach the Delta. The maximum flows to the Delta would be 30 cfs, which would occur each year during a 5-day long winter pulse flow. The magnitude and frequency of high flows under the 150-cfs pump station alternative are not expected to overtop the banks and divert most of the flows outside the Delta Habitat Area.

Notwithstanding the above conclusion, it is possible that even the proposed winter pulse flows of 30 cfs could be partially diverted to the overflow channel. During flow releases by LADWP in August 2001 (for Aqueduct cleaning purposes) of up to 30 cfs, LADWP observed surface water in the overflow channel from a helicopter. No ground observations were made at the time; hence, it is uncertain if the flows in the overflow channel were derived from seepage or flows from the river channel.

TABLE 11-5
SUMMARY OF ANTICIPATED BREAKOUT FLOWS TO THE OVERFLOW CHANNEL

Flows (cfs) along the River Below the Pump Station	Will the Flows Overtop the Bank with a Clogged Channel?	Will the Flows Overtop the Bank with a Cleared Channel?
7.2	No	No
25*	No	No
50**	Yes	No
150**	Yes	No

Source: Ecosystem Sciences (unpublished data).
* Flows of 25 cfs will be released for 10 days during Period 1 and Period 3 pulse flows, and flows of 30 cfs will be released for 5 days during Period 4 pulse flow (see Section 2.4.2).
**These flows would not occur under the 150-cfs pump station alternative due to channel losses of seasonal habitat flows prior to reaching the 150 cfs capacity pump station. They would only occur if LADWP supplemented the seasonal habitat flows along the river, and/or under the proposed project (50-cfs pump station), for 3-7 days during the seasonal habitat flows.

Extent of Anticipated Water Spreading in the Delta from Seasonal Habitat Flows

For the 150 cfs pump station alternative, seasonal habitat flows (with a maximum release of 200 cfs at the River Intake) would not be bypassed to the Delta, or would be bypassed for 1 day with a peak flow of about 28 cfs (see Table 11-4). Hence, under the 150 cfs pump station alternative, water spreading in the Delta during seasonal habitat flows would not occur, or would be negligible.

Mitigation Measure

D-1 This mitigation measure addresses the impact identified in Section 11.4.1.2, Impact Assessment No. 2 for the 150 cfs pump station, prepared by URS Corporation. Under the proposed monitoring and adaptive management program, LADWP shall make adjustments to the amount and timing of the baseflows and pulse flows up to an average annual flow of 9 cfs to reduce any possible adverse effects on the extent and condition of existing aquatic and wetland habitats in the Delta Habitat Area. This mitigation measure is not likely to reduce the identified impact to a less than significant level, but will reduce the magnitude of the impact.

11.4.2 Delta Modifications (With Either a 50 cfs or a 150 cfs Pump Station)

This alternative includes either a 50 cfs or 150 cfs pump station and physical modifications to the Delta to distribute flows in the Delta to increase wetlands and ponds. This represents an active management approach in which the hydrologic conditions and landforms in the Delta are manipulated to increase water spreading that will create seasonal ponds, increase infiltration, and indirectly enhance wetlands. It would include the following elements.

An instream structure would be constructed below the pump station in the north end of the Delta to divide the bypassed seasonal habitat flows (up to 150 cfs) from the main river channel to the west or east channels in varying proportions. The river channel above the split is about 250 feet wide. A concrete diversion structure with gates would need to be installed at the split. Each channel would have several gates to control the rate of flow into the channels. The diversion would be constructed to allow high flows (over 150 cfs) to pass over the top of the structure in a spillway. The water control structure would allow LADWP to concentrate flows in one or the other channel to increase the habitat benefits of the seasonal habitat flows in the Delta. For the sake of the impact assessment, it is assumed that the dimensions of the water control structure would be 25 feet wide, 10 feet high, and 20 feet long (parallel to the channel). It would have manually-operated gates. The structure would be an engineered diversion with a concrete spillway. It would be secured below scour depth in the channel bottom and anchored to the banks with concrete abutments.

Operation of the structure to concentrate more flows into one of the channels would temporarily raise the water surface elevation of the river upstream of the structure. Hence, it would be necessary to build up the banks of the river on both sides upstream of the structure for an unknown distance to prevent breakouts.

The distribution, depth, and duration of water from the seasonal habitat flows would be managed through numerous ditches and berms constructed in the Delta (see Figure 11-1). The berms would be designed to support access roads. The objective is to spread water to areas that it would not typically reach, and to retain the water for a longer period than would occur without the project. These actions would create more temporary surface water bodies, increase percolation, and potentially increase wetland productivity and extent. The berms would be 2 to 3 feet in height and about 3 feet wide, constructed of compacted on site materials. No slope or top protection would be installed. Some berms would be constructed with a 15-foot width and a layer of rocks to provide access to remote portions of the Delta or in areas where overland travel is not possible. Ditches would be constructed to convey water to target areas. Excavated material would be sidecast, or removed for use in constructing berms elsewhere in the Delta.

A conceptual plan showing major berms and ditches is provided on Figure 11-1. The total length of the berms and ditches in this plan totals about 8 miles. The plan also includes establishment of ponds. These features would be 1 to 3 feet deep depressions excavated in the Delta to create more permanent ponds. They would be designed to intercept shallow groundwater, as well as to be filled by the seasonal habitat flows from the river.

This alternative would result in the permanent loss of approximately 19 acres of wetland and playa habitats in the Delta due to construction of berms and access roads, as well as the diversion structure. The wetland loss may or may not be offset by the creation of expanded wetlands due to increased water spreading facilitated by the new structures. There is a high level of uncertainty about the effectiveness and long-term persistence of such structures. The data are insufficient to conclude that this alternative would maintain and possibly increase wetland habitats in the Delta Habitat Area. Hence, the potential loss of up to 19 acres of wetland and playa habitats in the Delta is considered a significant and unmitigable impact (Class I).

This alternative is not considered feasible and is rejected because it would result in new significant impacts, and it conflicts with the MOU goal of producing self-sustaining habitats.

11.4.3 Alternative Releases for the Seasonal Habitat Flows (With Either a 50 cfs or a 150 cfs Pump Station)

This alternative is proposed to increase the amount of water and magnitude of flows along the river during the seasonal habitat flows to compensate for channel losses. The increased flows might be expected to provide greater opportunities for spreading water in the river floodplain, which in turn could enhance riparian recruitment and productivity. The higher flows would cause greater physical disturbances, which could have ecological benefits. Finally, the greater amount of water would provide more water to the Delta to enhance aquatic and wetland habitats. This alternative would not require releases greater than 200 cfs from the River Intake; the seasonal habitat flows would be maintained along the entire Lower Owens River by releases from various spillgates along the river.

Under the proposed project, seasonal habitat flows would only be released from the River Intake. Releases from the River Intake would be subject to channel losses (e.g., percolation and evapotranspiration) along 62 miles of the river before reaching the pump station. As described in Section 6.3.2, during the maximum seasonal habitat flow (i.e., 200 cfs at the River Intake), flows of 12 to 88 cfs would be bypassed to the Delta for 5 days (totaling about 358 acre-feet above the baseflows) assuming a moderate channel loss rate of 1 cfs per mile (Table 6-9). Assuming a lower channel loss rate of 0.35 cfs per mile, flows would be bypassed to the Delta for 9 days (totaling about 857 acre-feet above the baseflows), with flows of 7 to 128 cfs being released to the Delta during the 9-day ramping period (Table 6-10).

Under this alternative, seasonal habitat flows would be maintained along the entire Lower Owens River by releases from various spillgates along the river. Flows would be managed to provide the target seasonal habitat flows at or near the pump station. The objectives of this alternative are two-fold:

- Create high flows along the entire river corridor to provide the ecological benefits described in the LORP Plan, including mobilization of debris and organic sediments, spreading of flows across the floodplain to replenish groundwater and stimulate seed germination, creation of seasonal aquatic habitats, and general physical disturbances to stimulate growth and nutrient cycling.

- Provide higher flows that bypass the pump station and reach the Delta to stimulate wetland productivity, create new seasonal aquatic habitat, and provide physical disturbances to stimulate growth and nutrient cycling.

If 200 cfs were to reach the pump station, flows would bypass the Delta with both a 150 cfs pump station and a 50 cfs pump station. As shown in Table 11-6, flows to the Delta with a 150 cfs pump station would occur for 2 days and involve about 98 acre-feet. In contrast, flows to the Delta with a 50 cfs pump station would occur for 11 days and involve about 1,286 acre-feet.

With a 150 cfs pump station and seasonal habitat flows that are not supplemented by spillgates, the total annual amount of water that would be initially discharged to the Delta would be up to 5,140 acre-feet. This quantity of water is derived from the initial daily 5.3 cfs baseflow that will be released to the Delta with four pulse flows of 20 to 30 cfs. The amount of the baseflow release may be increased or decreased as described in Section 2.4.2. No water from the seasonal habitat flows would reach the Delta. Under this alternative, an additional 97.8 acre-feet would be discharged to the Delta, resulting in a total of 5,238 acre-feet. While the additional flows are expected to benefit the river corridor, it is possible that only a negligible beneficial impact on the Delta would occur due to the short duration and low magnitude of the flows.

TABLE 11-6
ESTIMATE OF SEASONAL HABITAT FLOWS THAT REACH THE PUMP STATION AND THE DELTA WITH 150 AND 50 CFS PUMP STATIONS AND MODIFIED 200 CFS SEASONAL HABITAT FLOW RELEASE

Day	Supplemented Daily Flows that Reach the Pump Stn (cfs)	150 cfs Pump Station		50 cfs Pump Station	
		Avg. Daily Total Flows to the Delta (cfs) Above the 5.3 cfs Baseflows*	Avg. Daily Discharge to the Delta above 5.3 cfs Baseflow (acre-feet)**	Avg. Daily Total Flows to the Delta (cfs) Above the 5.3 cfs Baseflows*	Avg. Daily Discharge to the Delta above 5.3 cfs Baseflow (acre-feet)**
1	50	0	0	0	0
2	63	0	0	7.7	15.2
3	79	0	0	23.7	46.9
4	99	0	0	43.7	86.5
5	124	0	0	68.7	136.0
6	155	0	0	99.7	197.4
7	200	44.7	88.5	144.7	286.5
8	160	4.7	9.3	104.7	207.3
9	128	0	0	72.7	143.9
10	102	0	0	46.7	92.5
11	82	0	0	26.7	52.9
12	66	0	0	10.7	21.2
13	53	0	0	0	0
14	40	0	0	0	0
Total quantity of water that reaches the Delta (acre-feet) =			97.8	--	1,286.3

* The minimum flows to the Delta are assumed to be 5.3 cfs, independent of the by-pass of the seasonal habitat flows. (The amount of the baseflow release may be increased or decreased as described in Section 6.3.2). The values in this column are calculated by subtracting the baseflows (5.3 cfs) and the pump capacity (50 cfs or 150 cfs) from values in the previous column.
** Does not include volume of water associated with 5.3 cfs baseflows when such flows are not supplemented by seasonal habitat flows. Calculated using 1 cfs per day = 1.98 acre-feet.

With a 50 cfs pump station, greater flows would by-pass the pump station and reach the Delta under this alternative. The total amount of water that would be initially by-passed to the Delta under this alternative with a 50 cfs pump station would be 5,140 acre-feet, plus the 1,286 acre-feet from the seasonal habitat flows for a total of 6,426 acre-feet. This amount is still less than current and recent historic annual discharges of the Delta (median = 7,819 acre-feet per year). The additional flows are expected to benefit the river corridor; however, they would not be sufficient to reduce the significant impact to Delta habitat described in Section 6.3.2 to less than significant. The higher flows (maximum of 150 cfs) below the pump station during the seasonal habitat flows with a 50 cfs pump station and higher seasonal habitat flows at the pump station may overtop the western bank of the river below the pump station and above the center of the Delta (see Section 6.3.3). However, new aquatic and wetland habitats would be created over time along the overflow channel. There are no data or analytic tools to predict the extent of the habitat loss and gain in different portions of the Delta Habitat Area. Hence, this impact could range from significant and adverse to beneficial.

With regard to the seasonal habitat flows, the MOU provides that "*It is currently estimated that in years when the runoff in the Owens Valley watershed is forecasted to be average or above average, the amount* *of planned seasonal habitat flows will be approximately 200 cfs, unless the [MOU] Parties agree upon an alternative habitat flow…*" and does not specify that the seasonal habitat flows be maintained throughout the river. In contrast, the MOU provides that "*A base flow of approximately 40 cfs from at or near the Intake to the pumpback system to be maintained year round.*" As required by the MOU, LADWP has committed to provide and maintain a baseflow of approximately 40 cfs throughout the river; however, there is no obligation to provide additional water from spillgates to supplement the seasonal habitat flows released at the River Intake.

This alternative is rejected for the following reasons:

- This alternative is not required to meet the MOU requirements.
- This alternative would not reduce any significant impact.
- This alternative would result in a greater impact on the water supply of the City of Los Angeles compared to the proposed project. [Based on the moderate channel loss estimate (1 cfs per mile), an additional 928 acre-feet per year (= 1,286 – 358) would be released to the Delta compared to the proposed project. Based on the lower channel loss estimate (0.35 cfs per mile), an additional 429 acre-feet per year (= 1,286 – 857) would be released to the Delta compared to the proposed project. Therefore, the total water requirements of this alternative would range between approximately 16,723 and 17,222 acre-feet per year, compared to the approximately 16,294 acre-feet per year required for the proposed project.]
- This alternative is inconsistent with the intent and commitment in the 1991 EIR, which calls for a pump station to be constructed so that larger flows could be released to the river and minimize impacts to Los Angeles' water supply.

11.4.4 Alternative Regimes for Pulse Flows to the Delta

The objective of this alternative is to increase the effectiveness of the pulse flows to the Delta in enhancing aquatic and wetland impacts by modifying the number, amount, and timing of pulse flows. Two alternative pulse flow regimes are described below.

Regime to Maximize Wetland Plant Growth

The GBUAPCD has conducted studies on shallow groundwater conditions and vegetation response to groundwater with varying depths and salinities. In addition, the GBUAPCD has conducted several studies on shallow groundwater conditions in and near the Delta. Based on these studies, the seasonal interaction of freshwater entering the Delta, shallow saline groundwater, and wetland growth are better understood (see Section 6.3.2). In light of this understanding, the release regime for the four pulse flows could be slightly modified to maximize the effect on wetland plant growth, as described below:

- Freshwater flows in the early winter (October through November) fill root zones depleted during the growing season. The freshwater is not immediately used because plants are entering winter dormancy. By filling pore spaces and creating a freshwater lens, a rise in deleterious saline groundwater during the late winter and early spring is prevented. Under the proposed project, pulse flows would occur in September (Period 3) and in November-December (Period 4). Under this alternative, the Period 4 flows would occur in late October through November to meet plant growth needs. The Period 3 pulse flow would be re-scheduled to August, as described below.
- Freshwater flows in the early spring (March) ensure that freshwater lens remains intact and that plants ending dormancy encounter freshwater in their root zone. Under the proposed project, the

Period 1 pulse flow would occur in March-April. Under this alternative, the Period 1 flows would be scheduled a little earlier to meet plant growth needs.

- Freshwater flows in the summer maintain the freshwater in the root zone. The proposed project includes Period 2 flows in June - July. However, the proposed pulse flows do not include a mid-summer release in August, which would be beneficial to plant growth. Under this alternative, the Period 3 flows would be rescheduled to August to address wetland plant needs at this time of the year.

This alternative is considered feasible because it would not involve any additional releases to the Delta from the pulse flows, and therefore, would not affect flows to the Owens Lake Dust Control project or the municipal water supply to Los Angeles. Modification of pulse flows is a potential adaptive management action. There are no adverse environmental impacts associated with this alternative.

Regime Intended to Maximize Avian Needs

In a memorandum to the MOU parties dated June 23, 2000, the Sierra Club proposed a different release regime for the pulse flows to the Delta that would maximize benefits for various birds that use the Delta by ensuring adequate water year-round to maintain wetlands, shallow flooded areas (especially the brine pool transition area which is important to birds), and ponds. Their proposal was based on the observations that bird use of the Delta occurs year-round. Furthermore, Owens Lake and the Delta provide important habitat for many migrant species on the Pacific Flyway, and the proposed release regime for the Delta could be maximized for bird use, the key resource in the Delta. Their proposed seasonal releases are as follows:

- Period 1. Late March to mid-April, for stimulating plant growth and providing support for early nesting ducks and plovers. 10 days at 25 cfs (496 acre-feet per year)
- Period 2. Late May to early June, for recharging ponds and flooded areas to support new fledglings, and to maintain wetland growth. 10 days at 20 cfs (397 acre-feet per year)
- Period 3. Early to mid July to provide continued support for birds through maintenance of invertebrate populations and provide water for summer residents. 10 days at 20 cfs (397 acre-feet per year)
- Period 4. Early to mid-August to support wetlands and aquatic habitats (especially water to brine pool area), and provide water for fall migrants. 10 days at 20 cfs (397 acre-feet per year)
- Period 5. Early to mid-September to support fall migrants. 10 days at 20 cfs (397 acre-feet per year)
- Period 6. Late November to early December to maintain ponds and shallow water for resident and overwintering birds. 5 days at 15 cfs (298 acre-feet per year)

Under this alternative pulse flow regime, the number of days of pulse flows would increase from 35 to 55 days. The estimated water use during the pulse flows would increase from 1,687 acre-feet per year to 2,382 acre-feet per year – an increase of 695 acre-feet per year. The alternative release regime may provide greater benefits to birds than the proposed project because it targets specific time periods of critical bird activity, and may result in a nearly continuous availability of shallow flooded areas and ponds.

This alternative is considered feasible if it is within the approximately 6 to 9 cfs annual average flow releases to the Delta. Modification of pulse flows is a potential adaptive management action. There are no adverse environmental impacts associated with this alternative.

11.4.5 Cowbird Trapping Program

Background

The brown-headed cowbird (*Molothrus ater*) is a brood parasite. This species does not build its own nest, but instead, lays its eggs in the nests of other species, primarily songbirds. Cowbirds reduce the reproductive success of the host species by: (1) direct removal of host eggs by the female cowbird; and (2) by causing the death of host nestlings due to competition for food or nest space between the host and cowbird nestlings.

The LORP plan does not include trapping of brown-headed cowbirds, which prey on riparian breeding birds through nest parasitism. Cowbirds are very abundant in the LORP project area, and are commonly observed in riparian areas with native breeders. The LORP plan acknowledges their presence, but does not include trapping. Instead, there is an assumption that creation of more riparian habitat will provide sufficient refuge for riparian birds to withstand the parasitism rates.

Under this alternative, cowbird trapping would be implemented once riparian woodland habitat begins to establish and it appears that new habitat for riparian breeding birds is available. The trapping strategy would be developed in consultation with the California Department of Fish and Game and Audubon Society. In general, the most effective approach is to place traps at sites where cowbirds congregate (e.g., feed lots) during the breeding season, rather than in the riparian habitat where nesting is occurring. The trapping program would only be implemented if it appears that cowbird parasitism is continuing to adversely affect breeding by riparian birds in the LORP project area. The program would be temporary in nature. It would only continue to the extent that cowbird parasitism is a major detrimental factor to riparian bird breeding, and that the trapping program provides a measurable benefit.

The cowbird is a negative factor for the existing riparian breeding birds in the Owens Valley. There are some local ornithologists that believe that the use of cowbird trapping, even a modest effort during the breeding seasons, could have direct benefits on the reproductive success of riparian breeding birds in the LORP project area, including many LORP habitat indicator species. These biologists believe that use of this management tool could facilitate the achievement of the riverine-riparian system goals.

Feasibility, Impacts, and Effectiveness

There are no adverse environmental impacts associated with this alternative. However, it may not be effective in the LORP project area, nor contribute to the success of the LORP relative to riparian breeding birds for the reasons presented below.

LADWP has not proposed a brown-headed cowbird trapping program for the LORP because: (1) the available data do not indicate a substantial increase in the local or regional cowbird population in the last 30+ years; (2) cowbird parasitism rates and their impact to local bird populations are unknown; (3) there is no mechanism built into the LORP by which the need or effectiveness of a cowbird trapping program can be evaluated or justified; and (4) cowbird trapping is not a long-term solution for the management of songbird populations.

Since the late 1800's cowbird abundance in the Great Basin has greatly increased (Rothstein, 1994). The brown-headed cowbird was considered widespread in the Great Basin around 1900, and parasitism was documented in Mono County in the early 1900's (Rothstein, 1994). Although the brown-headed cowbird is currently more abundant than a century ago, Breeding Bird Survey (BBS) data for California and Great Basin Deserts for the period from 1966-2000 indicate no significant change in the number of cowbirds (USGS Patuxent Wildlife Research Center BBS data from the World Wide Web). In addition, data from the Lone Pine (1970-1999) and Big Pine (1968-2000) BBS routes also indicate no significant trends in the number of brown-headed cowbirds detected (USGS Patuxent Wildlife Research Center BBS data from the Internet).

The impact of cowbird parasitism to songbird populations in the Owens Valley is unknown. The presence or abundance of cowbirds in a particular area is not necessarily an indication of local parasitism rates. Thus, the mere presence of cowbirds in the LORP area is no indication of whether cowbird parasitism is a factor limiting bird populations in the project area. Cowbird parasitism rates vary temporally, spatially and with the identity of the host species. Many species are able to avoid reproductive losses from parasitism by abandoning parasitized nests and renesting, or by producing a successful nest at another time during the season (Smith et al., 2000).

Cowbird trapping programs are not an effective long-term management solution (California Partners in Flight Riparian Habitat Conservation Plan). Cowbird control programs spanning multiple years indicate that, based on the number of birds trapped each year, cowbird removal has no impact on cowbird populations (Griffith and Griffith, 2000). Although cowbird control may result in improved nest success of some species, the open-ended nature of cowbird control programs is undesirable from a management standpoint (Rothstein, 2000). In addition, without knowledge of local parasitism rates, control programs may be trying to “fix” a nonexistent problem, and wasting resources that could be better spent elsewhere (Rothstein, 2000).

Although cowbird parasitism reduces the nest success of some host species, it is only one factor that limits songbird populations. Nest parasitism and losses due to predation interact to reduce nest success (Grzybowski and Pease, 2000). Many studies have shown that both parasitism and predation rates are influenced by increasing habitat fragmentation and degradation. Predation, not cowbird parasitism, is usually the main cause of nest failure. Thus, the improvements in both habitat quality and extent that are expected to occur with the LORP should benefit bird populations from the standpoint of decreasing the likelihood of both predation and cowbird parasitism.

If, through further study and monitoring it is determined that cowbird parasitism is significantly limiting the breeding bird populations in LORP area despite improvements in habitat quality and connectivity, other management actions should be considered. Robinson et al. (2000) suggest that landscape-level management practices may be the best way to reduce parasitism levels. The California Partners in Flight Riparian Habitat Conservation Plan also recommends a landscape-level approach to management. This may involve an evaluation of local factors such as the condition of the habitat and the availability of feeding concentration areas near high host-density locations.

This alternative is considered feasible, but would not reduce any identified significant impact. At this time, for the reasons discussed above, LADWP and the County are not considering implementing this alternative.

11.4.6 Native Fishes in the Blackrock Waterfowl Habitat Area

The objective of this alternative is to provide habitat for endangered fish species in the Blackrock Waterfowl Habitat Area through the creation of open water habitat that is isolated from the river.
In 1998, USFWS completed a recovery plan for the native fish species of the Owens Basin (USFWS, 1998; see also Section 12.3). LADWP was not signatory to the plan as it conflicted with the LORP flow management needs and contained infeasible measures to implement in other areas of the Owens Valley on LADWP property. Conservation Areas were identified in the plan, which consist of areas where native fish populations should be established to achieve recovery. The Blackrock Conservation Area in the recovery plan generally coincides with the Blackrock Waterfowl Habitat Area from the LORP. The use

of this area for native fishes would be consistent with the recommendations in the USFWS Recovery Plan for this proposed Habitat Conservation Area.

To successfully establish a native fishery in the Blackrock Waterfowl Habitat Area, flow connections would need to be created and maintained between the various management units. However, due to site topography and the presence of existing roads, dikes, and berms, such connections cannot be created or maintained without installation of pumps and/or modifications of the roads, dikes and berms (in addition to those proposed for the LORP). In addition, providing and maintaining open water habitat and connections for native fish may be incompatible with the proposed wetting and drying cycles, which are needed to create and maintain habitat for waterfowl.

At this time, this alternative is not considered feasible because there are significant obstacles to its successful implementation, particularly related to creating and maintaining flow connections between the Blackrock management units described above. However, introduction of native fishes in the Blackrock area could be implemented as part of the HCP to be developed for all LADWP lands in the Owens Valley (see Section 2.7).

11.4.7 Modified Flooding Regime in Blackrock

The objective of this alternative is to use a modified flooding regime in the Blackrock Waterfowl Habitat Area to increase the expected benefits of this element of the LORP regarding the abundance and variety of wildlife at Blackrock.

In a letter dated July 26, 1999 commenting on the May 1999 draft LORP plan, CDFG expressed several concerns about the implementation of the plan for the Blackrock Waterfowl Habitat Area. CDFG made several suggestions to modify the flooding regime at Blackrock to increase the expected benefits of this element of the LORP. These suggestions represent an alternative flooding regime which is summarized below.

1. CDFG is concerned that the proposed lengths of the wet and dry cycles are excessive and can reduce habitat quality. A lengthy dry cycle can reduce the ability of wetland plants to recover when water is applied again, while a lengthy wet cycle can reduce plant diversity due to static water levels that favor only certain species. The duration of the proposed wet cycle would vary depending on the ratio of open water and emergent vegetation in each management unit. In CDFG's opinion, the near continuous flooding for more than 4 years could potentially inhibit habitat diversity. Hence, under this alternative, the dry cycle would only be 1 to 2 years in duration. Indicators of habitat diversity related to wetland plant colonization, growth, and decline would be monitored carefully to determine the optimal length of wet and dry cycles.

2. CDFG expressed concern that there are very high numbers of migrating waterfowl on the Pacific Flyway during wet years. As such, it would be beneficial to provide more than 500 acres of flooded wetlands in wet years to accommodate high numbers of wintering or migrating waterfowl. Hence, this alternative would provide more than 500 acres of flooded wetlands in wet years.

3. Under this alternative, the amount of water in all flooded units would be reduced in dry years. In CDFG's opinion, this approach would result in maintenance of greater habitat quality and/or quantity than under the proposed approach.

CDFG suggested an alternative short-term flooding-drying regime that would more closely mimic natural conditions based on CDFG's experience at their own waterfowl management facilities. Under this regime, flooding would occur in the fall-winter-spring period, followed by a drawdown in March-April,

with two brief episodes of flooding in May and June (to mimic snowmelt), and drying in July and August. Areas would be reflooded in September for overwintering and migrant waterfowl. The proposed flooding regimes for the four management units includes flooding from September to April, followed by partial drawdowns during the period of April to September. The amount and duration of the partial drawdown vary among management units. However, the proposed flooding regime does not include the fluctuating water levels in the late spring and summer suggested by CDFG. The flooding regimes at the Blackrock Waterfowl Management Area are flexible and can be altered based on the results of the monitoring program.
The alternative flooding regime alternative is considered feasible. The impacts of this alternative are similar to those of the proposed project. There are no significant adverse environmental impacts associated with this alternative.

To the extent that CDFG's recommendations are consistent with the MOU (e.g., 500 acres to be flooded in average or above average runoff years), these approaches and concepts are considered feasible and may be considered as part of adaptive management.

11.4.8 Alternative Sediment Stockpiling Sites

As described in Section 2.4.3.7, sediments will be periodically removed from the forebay at the pump station. In the Draft EIR/EIS, an oxbow area adjacent to the river was presented as the proposed stockpile site for storage of sediments removed from the forebay. The oxbow area currently contains a pond, freshwater marsh vegetation, and alkali meadow vegetation. Since publication of the Draft EIR/EIS, the proposed sediment stockpile site has been changed to two upland locations (previously labeled Alternative Stockpile Site 2 and 3 in the Draft EIR/EIS, Figure 11-2) to avoid impacts to the wetland located in the oxbow area (see Sections 2.4.3.7 and 5.1.2 and Figures 2-9 and 5-2). Figure 11-2 has been revised to reflect this change in the proposed locations of the stockpile sites.