MONO LAKE BASIN
WATER RIGHT DECISION 1631

Decision and Order Amending Water Right Licenses to Establish Fishery Protection Flows in Streams Tributary to Mono Lake and to Protect Public Trust Resources at Mono Lake and in the Mono Lake Basin

(Water Right Licenses 10191 and 10192, Applications 8042

September 28, 1994

STATE OF CALIFORNIA
WATER RESOURCES CONTROL BOARD

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

In the Matter of Amendment of the City of Los Angeles' Water Right Licenses for Diversion of Water From Streams Tributary to Mono Lake (Water Right Licenses 10191 and 10192, Applications 8042 and 8043)	DECISION 1631
	SOURCE: Lee Vining Creek Walker Creek Parker Creek Rush Creek
CITY OF LOS ANGELES, Licensee	COUNTY: Mono

DECISION AND ORDER AMENDING WATER RIGHT LICENSES TO ESTABLISH FISHERY PROTECTION FLOWS IN STREAMS TRIBUTARY TO MONO LAKE AND TO PROTECT PUBLIC TRUST RESOURCES AT MONO LAKE AND IN THE MONO LAKE BASIN

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- 11:2 — ending page and line number
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- XXXI — volume number
- RT — reporter's transcript

Citations to Exhibits:

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- SWRCB — abbreviation for the party submitting the exhibit

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

In the Matter of Amendment of the City of Los Angeles' Water Right Licenses for Diversion of Water From Streams Tributary to Mono Lake (Water Right Licenses 10191 and 10192, Applications 8042 and 8043) CITY OF LOS ANGELES, Licensee	DECISION 1631 SOURCE: Lee Vining Creek, Walker Creek, Parker Creek, Rush Creek COUNTY: Mono

DECISION AND ORDER AMENDING WATER RIGHT LICENSES TO ESTABLISH FISHERY PROTECTION FLOWS IN STREAMS TRIBUTARY TO MONO LAKE AND TO PROTECT PUBLIC TRUST RESOURCES AT MONO LAKE AND IN THE MONO LAKE BASIN

BY THE BOARD:

1.0 INTRODUCTION

In 1940, the City of Los Angeles and the City of Los Angeles Department of Water and Power (hereinafter "Los Angeles" or LADWP") received permits to divert water from four streams that are tributary to Mono Lake in Mono County, California. The permits authorized diversion of water for municipal use and hydroelectric power production. At the time it issued the permits, the Department of Public Works, Division of Water Resources (a predecessor to the present State Water Resources Control Board) concluded that the California Water Code required issuance of the permits despite anticipated damage to Mono Lake and other natural resources.

Los Angeles developed the proposed project and received Licenses 10191 and 10192 confirming its water rights in 1974. Los Angeles' diversions of water from the Mono Basin between 1941 and 1982 resulted in approximately a 45-foot decline in the water level of Mono Lake, approximately a 30 percent reduction in the surface area of the lake, and substantial damage to the environment. In 1979, the National Audubon Society, the Mono Lake Committee, and others filed the first in a series of lawsuits which challenged Los Angeles' water diversions in the Mono Basin. The resulting court decisions helped clarify the legal framework governing the State Water Resources Control Board's (SWRCB) present reexamination of the water rights previously granted to Los Angeles.

In addressing the issues involved in amending Los Angeles' water rights, this decision begins with a summary of the factual background, relevant legal requirements, the environmental review process, the evidentiary hearing, and the positions of the various parties. Next, the subjects of instream flows and other conditions needed to restore and maintain fish resources in the four affected streams are addressed. This decision then addresses additional measures needed for protection of other public trust resources in the Mono Basin. In recognition of the outstanding ecological significance of Mono Lake, this decision designates Mono Lake as an Outstanding National Resource Water.

In determining the appropriate amendments to Los Angeles' water right licenses for protection of public trust resources, the decision considers the effects which those amendments will have on the Los Angeles water and power supply and on the environment. The SWRCB's findings and conclusions are summarized in Section 9.0 of the decision. The appropriate amendments to Los Angeles' water right licenses are set forth in the order at the end of the decision.

The order amends the licenses to set quantified instream flow requirements for the protection of fish in each of the four streams from which Los Angeles diverts water. The order also establishes water diversion criteria to protect wildlife and other environmental resources in the Mono Basin. The water diversion criteria: (1) prohibit the export of water from the Mono Basin until the water level of Mono Lake reaches 6,377 feet above mean sea level; and (2) restrict Mono Basin water exports in a manner that is intended to result in the water level of Mono

Lake rising to an elevation of 6,391 feet in approximately 20 years.

The higher water level will protect nesting habitat for California gulls and other birds using the islands in Mono lake, maintain the long-term productivity of the Mono Lake brine shrimp and brine fly populations, enhance the scenic quality of the Mono Basin, meet applicable water quality standards, and reduce blowing dust from presently exposed lakebed areas in order to protect health and comply with federal air quality standards. The order also requires Los Angeles to prepare restoration plans to restore the four streams from which it diverts water and to restore a portion of the waterfowl habitat which was lost due to the decline of Mono Lake. Once the water level of 6,391 feet is reached, it is expected that Los Angeles will be able to export approximately 30.8 thousand acre-feet of water per year from the Mono Basin.

2.0 BACKGROUND

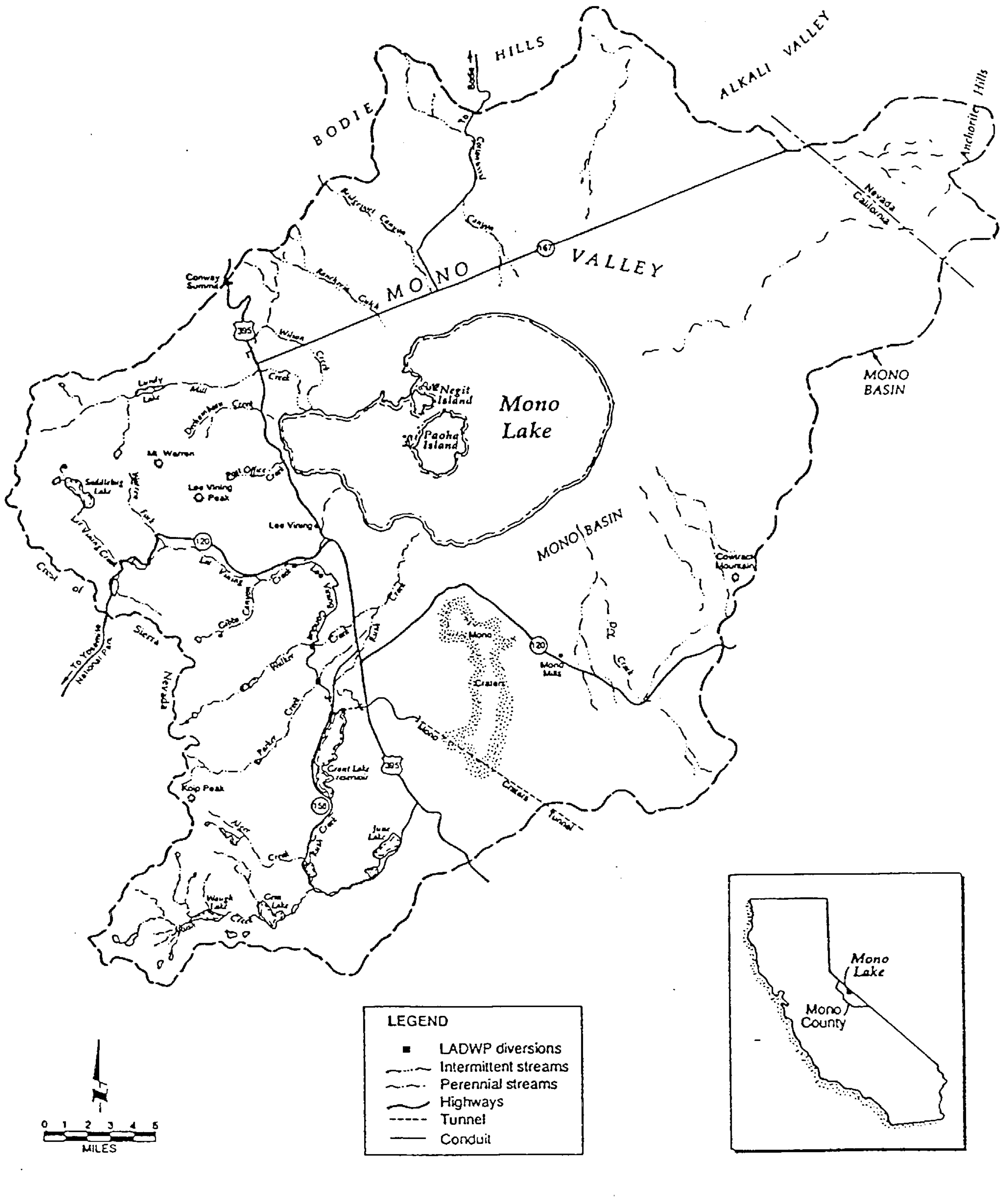
This portion of the decision summarizes the geographical, historical and legal background information underlying the SWRCB's consideration of amendments to Los Angeles' water right licenses.[1]

2.1 The Mono Basin

The Mono Basin is a closed basin located east of the crest of the Sierra Nevada Mountains (Figure 1). The basin is widely recognized for its scenic qualities, with the most prominent feature being Mono Lake. The Mono Basin National Forest Scenic Area was established in 1984 in recognition of the panoramic views and scenery of the Mono Basin. One of the distinctive scenic features of Mono Lake is the presence of conspicuous mineral deposits known as tufa towers, many of which are located

[1] *Unless otherwise noted, the background information in Sections 2.1 and 2.2 of this decision is from SWRCB Exhibit 7, "Draft Environmental Impact Report for Review of the Mono Basin Water Rights of the City of Los Angeles," May 1993.*

FIGURE 1



Source: Jones & Stokes Associates

within the Mono Lake Tufa State Reserve which was established in 1982.

The high salinity and alkalinity of Mono Lake have given rise to a unique ecological system of lake dwelling invertebrates that provide food for large numbers of migrating and nesting birds. Mono Lake is the site of the State's largest breeding colony of California gulls.

Mono Lake is a terminal lake in a watershed with no outlet. The historic water level and salinity of the lake have fluctuated considerably in response to natural conditions. Since 1941, the water elevation of Mono Lake has been affected by LADWP's diversion of water from four tributary streams. The water elevation of Mono Lake fell from 6,417 feet in 1941 to an historic low of 6,372 feet in 1982. The water elevation in the spring of 1994 was approximately 6,375 feet above mean sea level. The surface area of the lake declined from 54,924 acres in 1941 to approximately 37,688 acres in 1982. (SWRCB 7, Appendix A, Table A-1.)

2.2 LADWP Water Diversion Project

LADWP diverts water from Lee Vining Creek, Walker Creek, Parker Creek, and Rush Creek to Grant Lake Reservoir located on Rush Creek. The water then is exported from the Mono Basin through the Mono Craters Tunnel approximately 11 miles to the upper Owens River. The Mono Basin water commingles with water in the upper Owens River and flows south to Lake Crowley, a regulating reservoir on the upper Owens River. Water released from Lake Crowley is diverted through three hydroelectic power plants, Pleasant Valley Reservoir and Tinemaha Reservoir before entering the Los Angeles Aqueduct south of Bishop in Inyo County. The Los Angeles Aqueduct leads to Fairmont Reservoir in Los Angeles County from which it is distributed for a variety of municipal uses in the City of Los Angeles.

Prior to 1970, diversions from the Mono Basin were limited by the capacity of the Los Angeles Aqueduct. By 1970, however, the aqueduct system had been expanded and full diversion of flows from Lee Vining, Walker, Parker, and Rush Creeks became common during periods of average runoff. From 1974 to 1989, the City of Los Angeles diverted an average of 83,000 acre-feet of water per year from the Mono Basin. (SWRCB 7, p. 1-2.)

2.3 Issuance of Water Right Permits and Licenses

The appropriative water rights under which LADWP diverts water from the four Mono Basin streams were initiated by the filing of Water Right Applications 8042 and 8043 in 1934. The applications were approved on April 11, 1940 and permits were subsequently issued by the Department of Public Works, Division of Water Resources, a predecessor agency to the present SWRCB. The Department of Public Works recognized that the proposed water diversions would adversely affect the Mono Basin, but concluded that it was required to approve the project. This conclusion was based on the provision of the Water Commission Act (now codified as Water Code Section 1254) which states that action upon applications to appropriate water shall be guided by the policy that domestic use is the highest use of water. (Department of Public Works, Division of Water Resources Decision 455, April 11, 1940.)

Following completion of the second barrel of the Los Angeles Aqueduct in 1970, LADWP was able to divert the full flow of the four streams during periods of average runoff. In 1974, the SWRCB issued Water Right Licenses 10191 and 10192 which confirmed the city's rights to divert water from the four streams. License 10191 authorizes storage and direct diversion of water for municipal use. The total amount which may be beneficially used in one year is 147,700 acre-feet. License 10192 authorizes storage and direct diversion of water for hydroelectric power generation. The combined rate of direct diversion under both licenses is limited to 200 cubic feet per second (cfs).

2.4 Court Decisions Affecting Amendment of Water Right Licenses

The City of Los Angeles' diversion of water from the Mono Basin has been the subject of extensive litigation over the past fifteen years, resulting in three appellate court decisions which provide guidance regarding amendment of the water right licenses. In addition, the city has been subject to several preliminary injunctions governing water diversions on an interim basis. These court decisions are discussed below.

2.4.1 *National Audubon Society v. Superior Court*

In 1979, the National Audubon Society, the Mono Lake Committee, Friends of the Earth, and four Mono Basin landowners filed suit against the City of Los Angeles seeking to force the city into allowing more water to flow to Mono Lake. The plaintiffs argued that the city's diversions of water from the Mono Lake tributaries resulted in damage to Mono Lake in violation of the public trust doctrine. Traditionally, the public trust doctrine has been held to protect the public interest in navigation, commerce, and fishing on navigable waters.[2] More recently, the doctrine has been interpreted to protect a variety of natural resources and activities in the vicinity of navigable waters and nonnavigable tributaries of navigable waters.

The National Audubon Society suit eventually reached the California Supreme Court which entered its decision in 1983. (National Audubon Society v. Superior Court 33 Cal.3d 419, [189 Cal.Rptr. 346] cert. denied, 464 U.S. 977.) In discussing the applicability of the public trust doctrine to the relief sought by plaintiffs, the court stated:

> "The principal values plaintiffs seek to protect...are recreational and ecological--the scenic views of the lake and its shore, the purity of the air and the use of the lake for nesting and feeding by birds. Under Marks v. Whitney, supra, 6 Cal.3d 251, 98 Cal.Rptr. 790, 491 P.2d 374, it is clear that protection of these

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[2] *The California Supreme Court has also recognized that the public trust doctrine applies to protection of fish in nonnavigable streams. (People v. Truckee Lumber Co. (1897) 116 Cal. 397 [48 P. 374].)*

values is among the purposes of the public trust." (Id. at 435, 189 Cal.Rptr. at 356.)

The Audubon decision examined the relationship between the public trust doctrine and the California appropriative water rights system.[3] The Court recognized that in some cases the public interest served by water diversions may outweigh harm to public trust resources, but it held that harm to public trust resources should be avoided or minimized if feasible. (Id. at 427, 189 Cal.Rptr. at 349.) The Court went on to state that under Article X, Section 2 of the California Constitution: "All uses of water, including public trust uses, must conform to the standard of reasonable use." (Id. at 444, 189 Cal.Rptr. at 362.) The Court concluded that Los Angeles' water rights were granted without consideration of the effects of the diversions on the public trust resources of the Mono Basin and that, therefore, a responsible body should reconsider the allocation of water from the Mono Basin streams. (Id. at 447 and 452, 189 Cal.Rptr. at 365 and 369.) The Court also ruled that the SWRCB and the courts have concurrent jurisdiction to consider the effect of water diversions on public trust resources.

2.4.2 *California Trout v. State Water Resources Control Board*

In 1985, California Trout, Inc., the National Audubon Society and the Mono Lake Committee filed suit seeking a court order directing the SWRCB to rescind Los Angeles' water right licenses. The plaintiffs argued that the licenses should be rescinded because they did not include a condition requiring bypass of water for protection of fish in the four affected streams as required by Section 5946 of the Fish and Game Code. In 1989, the California Court of Appeal directed that the SWRCB amend the

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[3] *In describing the relationship between the public trust doctrine and California's appropriative water rights system the Court stated:*

> *"The public trust doctrine and the appropriative water rights system are parts of an integrated system of water law. The public trust doctrine serves the function in that integrated system of preserving the continuing sovereign power of the state to protect public trust uses, a power which precludes anyone from acquiring a vested right to harm the public trust and imposes a continuing duty on the state to take such uses into account in allocating water resources." (Id., 33 Cal.3d at 453, 189 Cal.Rptr. at 369.)*

city's licenses to include the condition required by Fish and Game Code Section 5946. (California Trout Inc. v. State Water Resources Control Board ("Cal Trout I") 218 Cal.App. 187 [255 Cal.Rptr. 184, 213].)

In 1990, the Court of Appeal entered a second decision which specified the following language to be added as a condition to the city's licenses:

> "In accordance with the requirements of Fish and Game Code section 5946, this license is conditioned upon full compliance with section 5937 of the Fish and Game Code. The licensee shall release sufficient water into the streams from its dams to reestablish and maintain the fisheries which existed in them prior to its diversion." (California Trout Inc. v. Superior Court ("Cal Trout II") 218 Cal.App 187 [266 Cal.Rptr.788].)

The Court of Appeal left determination of the precise long-term flow rates to the SWRCB and assigned the task of setting interim flow requirements to the Superior Court. (Id. at 212, 266 Cal.Rptr. at 803 and 804.) On April 4, 1990, the SWRCB amended the licenses to include the general condition specified by the court. The specific flow rates which are to be added as conditions of the licenses are discussed in Sections 5.0 through 5.4.3 below.

2.4.3 *Interim Relief and Stay Order of El Dorado County Superior Court*

Currently, all pending lawsuits concerning LADWP's water diversions in the Mono Basin are coordinated under the title of Mono Lake Water Rights Cases in the Superior Court for El Dorado County. (El Dorado County, Superior Court Coordinated Proceeding Nos. 2284 and 2288.) On December 6, 1989, the Superior Court entered a preliminary injunction which ordered that LADWP must allow sufficient water to pass its Mono Basin diversion facilities to restore and maintain the water level of Mono Lake at elevation 6,377 feet. On June 14, 1990, the Superior Court entered a preliminary injunction that established interim flows for the protection of fish in all four Mono Basin streams from which Los Angeles diverts water under its licenses. The interim flow requirements presently in effect were set in an amended order entered by the Superior Court on July 26, 1990.

On April 17, 1991, the Superior Court renewed the preliminary injunction requiring LADWP to bypass sufficient water to maintain the water level of Mono Lake at or above 6,377 feet. In order to comply with the preliminary injunctions, the city has not exported any water from the Mono Basin since 1989 except for a small amount needed to conduct a fishery study on the upper Owens River.

On September 29, 1989, upon motion of the SWRCB, the Superior Court entered an order staying further judicial proceedings on the merits of the coordinated litigation pending completion of the SWRCB's review of the city's water right licenses or September 1, 1993, whichever came first. By order dated June 8, 1993, the Court extended the stay of proceedings until the earlier of September 1, 1994 or completion of this Board's proceedings. The process which the SWRCB has used in developing amendments to the city's water right licenses is summarized in Sections 3.0 through 3.3.3 below. The Superior Court has continued to exercise jurisdiction over interim relief questions pending SWRCB amendment of the licenses.

2.5 Physical Solution Doctrine

In resolving disputes involving competing uses of water, California courts have frequently considered whether there is a "physical solution" available by which competing needs can best be served. (Peabody v. Vallejo, 2 Cal.2d 351, 383-384 [40 P.2d 486] (1935); City of Lodi v. East Bay Municipal Util. Dist., 7 Cal.2d 316 [60 P.2d 439] (1936).) Adoption of a physical solution is consistent with the constitutional goal of promoting maximum beneficial use of the State's water resources. The SWRCB has previously concluded that the physical solution doctrine can be employed to establish a flow regime for protection of fish in which the required releases of water from storage exceed the rate of inflow to a reservoir at a particular time. (SWRCB Order WR 90-16, pp. 8-9.) In the present situation, the California

Court of Appeal decision recognized that, as the price of continued appropriation of water, an appropriator can be compelled to take reasonable steps to restore the streams and fisheries. (California Trout Inc. v. Superior Court, supra., 218 Cal.App.3d at 210, n.6 [266 Cal.Rptr. at 801-802, n.6].)

Thus, in establishing the flow requirements necessary to comply with Fish and Game Code Section 5937 in the present situation, the SWRCB has examined the relationship between flows and fishery habitat, as well as the availability of other measures which would help restore the fishery while allowing diversion of some water for municipal use. (See Sections 5.0 through 5.3.) Similarly, in examining the use of water at Mono Lake for providing waterfowl habitat, this decision acknowledges that there are alternative ways of restoring a portion of the lost waterfowl habitat without requiring a return to the pre-1941 lake elevation. (See Section 6.4.7.)

2.6 Summary of Legal Framework Governing Amendment of Los Angeles' Water Right Licenses

All diversions and use of water in California are subject to the mandate of Article X, Section 2 of the California Constitution to maximize the beneficial use of water and to prevent the wasteful or unreasonable use, method of use, or method of diversion. The Audubon decision establishes that the SWRCB has the additional responsibility to consider the effect of water diversions upon interests protected by the public trust and to avoid or minimize harm to public trust uses to the extent feasible. The public trust has been held to protect a broad range of values including fishing, hunting, swimming, boating, recreation, scenic values, air quality, and wildlife habitat. (National Audubon Society v. Superior Court, supra., 33 Cal.3d at 434 and 435, 189 Cal.Rptr. at 356.) The California Supreme Court concluded that the lack of consideration to protection of public trust uses at the time that the City of Los Angeles acquired its appropriative water rights in the Mono Basin requires that this Board or the courts take "a new and objective look at the water resources of the Mono Basin." (Id., 33 Cal.3d at 452, 189 Cal.Rptr. at 369.)

The SWRCB's review of Los Angeles' water rights is subject to Fish and Game Code Section 5946 which applies to permits and licenses for water diversions in portions of Inyo and Mono Counties. Section 5946 requires that the licenses be conditioned upon full compliance with Fish and Game Code Section 5937. In this instance, the Court of Appeal has interpreted the applicable law to require that LADWP must release sufficient water into the streams "to reestablish and maintain the fisheries which existed in them prior to its diversion of water." ("Cal Trout II," supra., 218 Cal.App.3d at 213, 266 Cal.Rptr. at 803 and 804.) With respect to flows needed for protection of fish, the Court of Appeal ruled that "the Legislature has already balanced the competing claims for water from the streams affected by section 5946 and determined to give priority to the preservation of their fisheries." (Id., 218 Cal.App.3d at 201, 266 Cal.Rptr. at 796.)

In accordance with the judicial decisions discussed above, the SWRCB's approach is to determine what flows are needed for protection of fish. Then the decision addresses the need for additional water and other measures to protect public trust resources at Mono Lake and the surrounding area in view of the competing uses of water by Los Angeles. Finally, the California Environmental Quality Act ("CEQA," Public Resources Code Section 21000, et seq.) requires addressing how best to mitigate or avoid potential adverse environmental impacts that may occur as a result of the changes in Mono Basin water diversions required by this decision.

3.0 PROCESS FOR REVIEW OF MONO BASIN WATER RIGHTS

In reviewing Los Angeles' water rights and competing uses to be made of Mono Basin water resources, the SWRCB has utilized information developed through preparation of an environmental impact report and other evidence presented during the course of a lengthy water right hearing. In evaluating anticipated effects of alternative proposals for regulating the city's diversions, the SWRCB considered evidence presented at the hearing as well as projections developed using computer models introduced into evidence during the hearing.

3.1 Environmental Impact Report

On September 11, 1989, the SWRCB held a public hearing to provide an opportunity for interested parties to comment on the suggested scope of the SWRCB's review of Mono Basin water diversions, public trust uses of Mono Basin water, and other beneficial uses of water diverted from the Mono Basin. Interested parties were also invited to comment on the scope of the environmental impact report (EIR) being prepared as part of the SWRCB's review.

On October 10, 1989, SWRCB staff established five technical advisory groups to assist in identifying specific environmental issues to be addressed in the Draft EIR and to help identify relevant information that could be used in the environmental review process. Participants in the technical advisory groups included representatives of federal, state and local governments (including the City of Los Angeles), environmental groups, colleges and universities, private consultants and members of the public. The groups met for varying lengths of time, with the technical advisory group on hydrology and aqueduct operations continuing to meet into early 1994.

The Notice of Preparation for the EIR was issued on January 4, 1990. The notice was mailed to over 500 groups and individuals and widely published in newspapers. SWRCB staff prepared a scope of work and requested proposals for preparation of an EIR from over 40 resource management consulting firms. The proposals that were submitted were reviewed by SWRCB staff, Los Angeles, and a joint review team composed of representatives from Mono County, California Trout, Inc., the U.S. Forest Service, the Department of Fish and Game (DFG), the National Audubon Society and the Mono Lake Committee. Jones and Stokes Associates, Inc. was selected as the primary EIR contractor in June 1990, and numerous other scientists having expertise on the Mono Basin were retained as subcontractors.

In preparing the draft EIR, the consultant considered information from numerous sources including: a 1987 National Academy of Sciences report titled, "The Mono Basin Ecosystem: Effects of

Changing Lake Level;" a 1988 report prepared by the University of California, Riverside, Water Resources Center titled, "The Future of Mono Lake: Report of the Community and Organization Research Institute (CORI) Blue Ribbon Panel;" and the United States Forest Service's 1990 "Final Environmental Impact Statement and Comprehensive Management Plan, Mono Basin National Forest Scenic Area."

A three-volume draft EIR was distributed for public comment on May 26, 1993. Twenty-eight auxiliary reports on various subjects were also prepared. Numerous governmental agencies, environmental groups, and individuals submitted comments on the Draft EIR. Many of the consultants who assisted in preparing the Draft EIR presented testimony at the water right hearing.

In accordance with provisions of the California Environmental Quality Act, the Final EIR identifies measures that are considered necessary to avoid, reduce, or mitigate potential adverse environmental impacts resulting from this decision. This decision includes findings of overriding considerations with respect to those adverse environmental effects which cannot feasibly be reduced or mitigated below a level of significance. (Title 14, Cal. Code of Regs., Section 15093.)

3.2 Water Right Hearing

Following a prehearing conference on April 19, 1993, the SWRCB issued a hearing notice on June 30, 1993 regarding amendment of Los Angeles' water right licenses for diversion of water from streams tributary to Mono Lake. The June 30, 1993 hearing notice explained that the SWRCB intended to amend the licenses to establish quantified instream flow requirements as necessary to comply with the public trust doctrine, the California Fish and Game Code, and judicial rulings requiring that the specified flows be sufficient to reestablish and maintain fisheries equivalent to those which existed prior to the diversion of water by Los Angeles. The notice also explained that the SWRCB intended to amend Los Angeles' Water Right Licenses 10191 and 10192 to specify water surface elevation requirements for Mono

Lake and other conditions necessary to provide appropriate protection for public trust resources and the beneficial uses of water of Mono Lake and its tributaries.

In addition to identifying the procedures governing participation in the evidentiary portion of the water right hearing, the hearing notice provided that interested parties could present non-evidentiary policy statements on the issues under consideration. Hearing sessions for receipt of policy statements were held in Los Angeles, Mammoth Lakes, and Sacramento.

The evidentiary hearing began on October 20, 1993 and ended on February 18, 1994. The evidentiary hearing was held in Sacramento with the exception of one day in Lee Vining to receive testimony from Mono Basin residents. Board Member Marc Del Piero served as hearing officer. There were over 40 hearing days, including three days for non-evidentiary policy statements. Testimony was provided by more than 125 witnesses, and over 1,000 exhibits were introduced into evidence. Parties participating in the evidentiary hearing were allowed until March 21, 1994 to submit legal briefs and until April 29, 1994 to submit reply briefs.

3.3 <u>Use of Computer Models to Assist in Evaluating Anticipated Effects of Alternative Proposals For Regulating Mono Basin Water Diversions</u>

Much of the evidence presented during the hearing was developed through use of computer modeling. Computer models were utilized to help evaluate or predict: (1) the amount of fishery habitat available at different flow levels; (2) the impacts of various alternative water diversion scenarios on the water elevation of Mono Lake and the water supply available to Los Angeles; (3) expected runoff under different hydrologic conditions; and (4) the anticipated economic cost of alternative approaches to regulating water diversions.

Computer models can be used to: (1) estimate conditions that are not readily susceptible to direct measurement and, (2) to estimate future conditions or effects that would be expected to occur under various assumed conditions. In situations where a computer model provides the only feasible way of evaluating expected conditions, the results produced by a computer model may provide the best evidence available to the decision-maker.

Sections 3.3.1 and 3.3.3 briefly describe the computer models used in reaching this decision or which will be used in implementing requirements of this decision. In each case, the SWRCB recognizes that there is a degree of uncertainty inherent in computer modeling. Nevertheless, the record indicates that the computer models discussed in Sections 3.3.1 through 3.3.3 below provide the best available tools for evaluating the particular conditions or effects analyzed by the respective models. With regard to evaluation of economic effects, the SWRCB did not rely on the computer modeling results submitted by LADWP or California Trout, Inc. for the reasons explained in Section 7.1.5.

3.3.1 *IFIM/PHABSIM Fisheries Flow Models*

The DFG flow recommendations for fish protection in Lee Vining Creek, Rush Creek, and the upper Owens River were based upon evaluation of the relationship between trout habitat and flow as determined using the Instream Flow Incremental Methodology (IFIM) and the Physical Habitat Simulation Model (PHABSIM). (DFG 3, p. 2.) The EIR consultant did a similar fishery study for the middle Owens River. (SWRCB 13W, p. 2-1.)

The fishery study consultants collected on-site data and measurements of various parameters such as water depth, velocity, substrate, and cover conditions. The data were used to develop hydraulic models of the streams in question. The hydraulic models, and information on fish habitat criteria, were utilized to determine the amount of weighted useable area (WUA) available to various life stages of target species at different flows. Data showing the relationship between flows and weighted useable area, together with information on other factors affecting the fishery, were then used to develop recommended streamflow regimes for the species of interest. (DFG 117, p. 1-18.)

Although in some instances the flow requirements established in this decision vary from the recommendations set forth in the various fishery studies, the SWRCB believes that the determinations of weighted useable area for identified lifestages of specified species provide a reasonable basis for estimating the amount of habitat available at differing levels of flow. Further discussion regarding fishery habitat on the streams under consideration is provided in Sections 5.0 through 5.4.4 below.

3.3.2 *Los Angeles Aqueduct Monthly Planning (LAAMP) Model*
The water supply and lake level impacts of various methods of regulating LADWP's water diversions were estimated using the Los Angeles Aqueduct Monthly Planning Model (LAAMP Model) which was developed as part of the environmental impact report process. The LAAMP Model was developed as a tool to simulate the relationships between flows in the tributary streams, Mono Lake surface elevation, and water deliveries to Los Angeles through the Los Angeles Aqueduct. In using the LAAMP Model to predict various anticipated effects of different water diversion scenarios, average monthly streamflow data are used for the 50-year period of record covering runoff years 1940 through 1989. The LAAMP Model was developed to allow the user to account for operational objectives, physical constraints of diversion facilities and reservoirs, and applicable agreements governing LADWP's water diversion and storage facilities.

Expert testimony was presented by the EIR consultants and others regarding predicted impacts on water supply, lake level and flows of various alternatives identified in the Draft EIR and variations of those alternatives. In response to comments on the LAAMP Model used in preparing the Draft EIR (LAAMP Version 2.0), an Operations Modeling Technical Advisory Group met during the course of the hearing to consider revisions to the LAAMP model to improve its predictive capability.[4] Following revisions to the model, the EIR consultants presented testimony and exhibits regarding effects of various diversion scenarios on lake level and on the water supply available to Los Angeles as determined through use of the revised LAAMP model. (SWRCB 40 through SWRCB 48; RT XXXV, pp. 13-105.)

Two revised versions of the model, designated as LAAMP Version 3.3 and LAAMP Version 3.31 were received into evidence. (SWRCB 49.)[5] As discussed in Section 7.1.2 below, the SWRCB used LAAMP Version 3.31 to assist in evaluating the anticipated impacts of the requirements established by this decision.

3.3.3 *LADWP Runoff Forecast Model*

Hydrologic classifications or year types are relative indicators of the water available in a hydrologic basin due to all types of precipitation and runoff. In order to reflect the variation in flows which occurs under natural conditions, DFG's fishery flow recommendations for Lee Vining Creek and Rush Creek vary depending upon the amount of runoff expected in a given year. DFG's "dry year" classifications include the years having runoff which would be exceeded in 80 percent of all water years while "wet years" are considered to be those years having runoff that would be exceeded in only 20 percent of all water years. "Normal years" are those years which fall in between the 20 percent and 80 percent range. (DFG 170A, p. 1.)[6] In terms of average runoff equating to the various year type classifications for the Mono

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[4] *In addition to SWRCB staff and the EIR consultants, participants in the Operation Modeling Technical Advisory Group meetings included representatives of the Los Angeles Department of Water and Power, the Department of Fish and Game, and Peter Vorster who testified on behalf of the Mono Lake Committee, National Audubon Society and California Trout, Inc.*

[5] *The changes which were made in LAAMP Version 3.3 are described in SWRCB Exhibit 40. In addition to the changes made in Version 3.3, LAAMP Version 3.31 corrects a minor error relating to how the "fish flow deficits" were treated. This correction changes the annual results by approximately 100 acre-feet. (RT XXV, pp. 34 and 35.)*

[6] *In the case of DFG's channel maintenance and flushing flow recommendations for Rush Creek, DFG further divided the "normal year' category into wet-normal, normal, and dry-normal, with each of the ranges occurring 20 percent of the time. (DFG 170A.)*

Basin, a dry year is a year having 68.5 percent or less of average runoff, a wet year is a year having 136.5 percent or more of average runoff and a normal year is any year having between 68.5 percent and 136.5 percent of average runoff. The average runoff value is based on a fifty-year moving average of runoff which is recalculated every five years. (LADWP 133, p. 1.)

LADWP prepares runoff forecasts for the Mono Basin to assist in determining the amount of water expected to be available from the Los Angeles Aqueduct. (LADWP 55, p. 8.) The LADWP forecasts correspond to the runoff year which goes from April 1 through March 31. The forecasts are made near the first of the month in February, March, April, and May. LADWP uses precipitation data, snow survey data and weather forecasts as input data for LADWP's Runoff Forecast Model. (LADWP 147, p. 1.) Most precipitation in the Mono Basin generally has occurred by May 1, so the May 1 forecast is reasonably accurate. (LADWP 52, p. 7.) For purposes of determining the applicable flow requirements for fishery protection, as well as for channel maintenance and flushing purposes, the conditions which are added to LADWP's water right licenses by this decision refer to runoff year type classifications of wet, normal and dry years based on projections from the LADWP Runoff Forecasting Model for the Mono Basin.

4.0 PARTIES PARTICIPATING IN EVIDENTIARY HEARING

The parties who participated in the evidentiary hearing were the California Air Resources Board (ARB), the California Department of Fish and Game (DFG), the California State Lands Commission (SLC), the California Department of Parks and Recreation (DPR), California Trout, Inc. (CT), the City of Los Angeles and the City of Los Angeles Department of Water and Power (Los Angeles or LADWP), the Great Basin Unified Air Pollution Control District (GBUAPCD), Haselton Associates (HASELTON), the National Audubon Society and the Mono Lake Committee (NAS&MLC), the Sierra Club (SC), the Metropolitan Water District of Southern California (MWD), the United States Fish and Wildlife Service (USFWS), the

United States Forest Service (USFS), and the United States Environmental Protection Agency (USEPA).[7]

In addition to evidence presented by the parties, SWRCB staff introduced documents from the files relevant to the SWRCB's review process and called upon the EIR consultant to present testimony and exhibits relative to preparation of the Draft EIR and subjects analyzed in that document.

The large number of parties and issues involved makes it impractical to summarize each party's position with respect to each specific issue considered. In general, many of the parties urge the SWRCB to adopt the DFG streamflow recommendations and to establish a minimum lake level at or above 6,390 feet in order to protect various public trust resources of the Mono Basin. The National Audubon Society and Mono Lake Committee recommend adoption of the DFG streamflow recommendations and a managed lake level of 6,405 feet. LADWP introduced a revised version of its Mono Lake Management Plan which calls for a lake level of 6,377 feet, and which provides for specified minimum streamflows in the four affected streams. Frank Haselton, appearing on behalf of John Arcularius and the Arcularius Ranch, urges that consideration be given to protection of the fishery in the upper Owens River. The Metropolitan Water District of Southern California presented evidence regarding future water supplies available to its service area, but made no recommendations regarding amendment of Los Angeles' water rights.

Following the close of the evidentiary hearing, several of the parties submitted legal briefs summarizing their positions, arguments and recommendations on various issues.

[7] *The abbreviation shown in parentheses for each of the specified parties is used when citing exhibits introduced by a particular party at the hearing.*

5.0 RESTORATION AND PROTECTION OF FISHERY RESOURCES IN THE MONO BASIN

As discussed in Section 2.6 above, the SWRCB's first task in this instance is to determine the flows needed to reestablish and maintain the fisheries that existed prior to LADWP's diversion of water from the four Mono Basin streams. DFG conducted detailed fishery studies and presented recommendations regarding minimum flows for protection of fish in each of the four Mono Basin streams from which Los Angeles diverts water. Alternative streamflow recommendations for Rush and Lee Vining Creeks were presented by LADWP. In addition to presenting evidence regarding minimum flow recommendations for providing fishery habitat, the parties also introduced considerable evidence regarding the desirability of periodic channel maintenance or flushing flows.

Following evaluation of evidence regarding desired streamflows, this decision considers other related measures to help reestablish and maintain pre-project fishery resources. Flows and other fishery restoration measures are discussed on a stream-by-stream basis beginning with the northernmost stream from which LADWP diverts water and proceeding southward.

5.1 <u>Lee Vining Creek</u>

5.1.1 *Pre-Project Conditions*

The fishery that existed in Lee Vining Creek prior to diversion of water by Los Angeles was described by former DFG employee Eldon Vestal as a good trout fishery which sustained catchable brown trout averaging 8 to 10 inches in length. (CT 5.) There were several other accounts that depicted the fishery as a good trout stream with an abundance of 8 to 10 inch trout, with some trout reaching 13 to 15 inches. (NAS&MLC 124, p. 14.) The Draft EIR summarized testimony from 1990 proceedings in El Dorado Superior Court which indicated that plantings of hatchery reared trout fingerlings and catchable rainbow trout were common in the early 1900s. In 1940, the predominate fish in Lee Vining Creek were brown trout. Small pockets of rainbow trout were present along with the rare occurrence of eastern brook trout. (SWRCB 7 Vol. 1, p. 3 D-7.)

No definitive evidence of pre-diversion fish populations in Lee Vining Creek was presented. Based on the evidence presented, we conclude that the pre-project fishery in Lee Vining Creek primarily consisted of brown trout augmented by planting of brown trout fingerlings and catchable rainbow trout. The planted fish probably contributed to the high angling success. The instream flow requirements established in this decision are designed to provide the conditions necessary to maintain a resident brown trout fishery similar to that which existed in Lee Vining Creek prior to the diversion of water by LADWP.

The physical conditions on Lee Vining Creek prior to 1941 were the subject of extensive testimony and numerous exhibits. (E.g., SWRCB 7, LADWP 7 and 9, NAS&MLC 116, 120, 124, 125, 127, 129, 136 and 175.) A large number of the same documents were submitted by several of the interested parties. In addition to the testimony of Eldon Vestal and several long-time residents of the Mono Lake area, the SWRCB heard testimony from several expert witnesses who had reviewed aerial photographs, hydrologic records and other documentary evidence relevant to the physical conditions on Lee Vining Creek prior to the LADWP diversions. Despite the amount of testimony and exhibits, detailed information regarding the pre-1941 physical conditions in Lee Vining Creek is limited.

The Trihey and Associates report titled "Comparison of Historic and Existing Conditions on Lower Lee Vining Creek, Mono County, California" by Mitchell Katzel (NAS&MLC 116), summarized much of the historical information presented in the exhibits mentioned above. The Trihey and Associates report also was based upon technical studies and investigations conducted by a multidisciplinary planning team which included individuals who testified on behalf of various parties, including LADWP, NAS&MLC, and DFG. The report concluded that there has been little geomorphic or vegetative change between the LADWP diversion dam and Highway 395. (NAS&MLC 116, p. 1.) Most of the impacts of the exportation of water by LADWP occurred below Highway 395. Fire in the early 1950s destroyed much of the riparian vegetation. Livestock grazing also impacted the riparian vegetation and caused the local breakdown of stream banks. Once the riparian vegetation was in decline, the combined effects of fire, grazing and the limited water supply contributed to a near total loss of vegetation in the area described as segment 3 in the report. Additional information regarding riparian vegetation is provided in Section 6.3 below.

Prior to the diversion of water by LADWP, lower Lee Vining Creek was a multiple channel system characterized by a single main channel and between two and five subsidiary channels. The total main channel length between Highway 395 and the county road was approximately 9,800 feet and the total subsidiary channel length was approximately 15,600 feet. Both the main and subsidiary channels were generally narrow, consisting of deep water habitat which was provided by moderate flows. The main channel width was approximately 13 feet and subsidiary channels ranged from 5 to 8 feet wide. High streamflows readily increased water depth in the main and subsidiary channels. High streamflows also over topped the bank and deposited organic rich sediment on the floodplain. (NAS&MLC 175.)

5.1.2 *Flows for Providing Fishery Habitat*

The major instream flow study on Lee Vining Creek was conducted during 1990 and 1991 by the firm of Aquatic Systems Research under the direction of DFG. This comprehensive investigation used the instream flow incremental methodology (IFIM) in order to determine instream flow requirements for brown trout in lower Lee Vining Creek. Study elements included: delineating and quantifying existing aquatic habitat; assessment of historic and existing hydrology; development of weighted useable area/stream discharge relationships for brown trout fry, juvenile, adult and spawning life stages; estimation of existing fish populations by habitat type; examination of fluvial geomorphology; monitoring and simulating water temperature; and assessment of riparian vegetation, factors that lead to ice formation and fish food availability. The DFG study evaluated flows for the main channel of Lee Vining Creek, but made no flow recommendations for additional channels.

DFG presented recommendations for instantaneous flow releases to lower Lee Vining Creek on a monthly basis based on information contained in "The Lee Vining Creek Stream Evaluation Report 93-2, Volumes 1 and 2," dated July 1993. (DFG 54 and 55.) The flows in the 1993 report were presented as DFG's recommendations for maintaining fish in good condition pursuant to Fish and Game Code Sections 5937 and 5946. (DFG 3, p. 4.) At the time the Draft EIR was circulated for review and comment, the instream flow information which DFG had provided to the EIR consultant was based on a report from DFG labeled "Draft Final, July 13, 1992." The information in DFG's final report is considerably different than the information in the 1992 report which was used in preparing the Draft EIR.

The LADWP Mono Lake Management Plan describes proposed operational criteria which LADWP contends will maintain Mono Basin resources, while creating sufficient flexibility to operate the water diversion system efficiently and allow for emergency response. (LADWP 53, pp. 36-50.) The LADWP Mono Lake Management Plan proposes minimum monthly instream flows along with occasional channel maintenance flows. These instream flow recommendations were intended to mimic the natural hydrology. (LADWP 53, Section 2, p. 40; LADWP 154, pp. 1-13.) A revised LADWP Mono Lake Management Plan, as described in the written testimony of Mr. William Hasencamp, proposes a new set of recommended instream flows for Lee Vining, Parker, Walker and Rush Creeks. (LADWP 133.) The revised instream flows are proposed as part of a management scheme which LADWP contends would maintain the fisheries while evening out releases of water needed to maintain the water elevation of Mono Lake. (LADWP 154, p. 2, Table 1.)

The NAS&MLC presented testimony by Mr. Woody Trihey and Ms. Jean Baldridge which provided an instream flow evaluation of possible effects upon stream conditions of various flows regimes. This recommendation was based upon the review of DFG's instream flow studies and comparison of the restoration treatments implemented for the Restoration Technical Committee. (NAS&MLC 1X, pp. 2-7.)

In a letter to SWRCB staff dated August 30, 1993, Mr. Trihey discussed his observations on Lee Vining Creek during various flow events and the subsequent effects upon the restoration treatments which were implemented as part of the interim stream restoration program under the direction of the El Dorado County Superior Court. (NAS&MLC 104.)

Pending establishment of long-term flow requirements by the SWRCB, the El Dorado County Superior Court heard evidence and issued an order dated June 14, 1990 which set interim instream flows for Lee Vining Creek and the other three streams from which LADWP diverts water. Table 1 below shows the minimum instream flow recommendations of DFG, the flows from the original and revised versions of the LADWP Mono Lake Management Plan, and the interim flows established by the Superior Court. Table 1 also shows the flows which the SWRCB finds to be appropriate to reestablish and maintain the fisheries which existed in Lee Vining Creek before LADWP began its diversion. The basis for determination of the Lee Vining Creek instream flow requirements is discussed following the table.

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TABLE 1: LEE VINING CREEK INSTREAM FLOW RECOMMENDATIONS/REQUIREMENTS*

HYDROLOGIC YEAR		MONTH	DFG	SWRCB	LADWP	LADWP REVISED	INTERIM
DRY		APRIL	37	37	25	25	35
		MAY	37	37	25	30	35
		JUNE	37	37	25	35	35
		JULY	37	37	25	35	35
		AUGUST	37	37	25	30	35
		SEPTEMBER	37	37	25	20	35
		OCTOBER	25	25	15	20	25
		NOVEMBER	25	25	15	20	25
		DECEMBER	25	25	15	20	25
		JANUARY	25	25	15	20	25
		FEBRUARY	25	25	15	20	25
		MARCH	25	25	15	20	25
NORMAL		APRIL	54	54	25	25	35
		MAY	54	54	25	30	35
		JUNE	54	54	25	35	35
		JULY	54	54	25	35	35
		AUGUST	54	54	25	30	35
		SEPTEMBER	54	54	25	25	35
		OCTOBER	40	40	15	20	25
		NOVEMBER	40	40	15	20	25
		DECEMBER	40	40	15	20	25
		JANUARY	40	40	15	20	25
		FEBRUARY	40	40	15	20	25
		MARCH	40	40	15	20	25
WET		APRIL	54	54	25	25	35
		MAY	95	54	25	30	35
		JUNE	95	54	25	35	35
		JULY	95	54	25	35	35
		AUGUST	95	54	25	30	35
		SEPTEMBER	54	54	25	25	35
		OCTOBER	40	40	15	20	25
		NOVEMBER	40	40	15	20	25
		DECEMBER	40	40	15	20	25
		JANUARY	40	40	15	20	25
		FEBRUARY	40	40	15	20	25
		MARCH	40	40	15	20	25

*All flows are in cubic feet per second (cfs)

DFG Exhibits 54 and 55 identify streamflow regimes for dry, normal and wet hydrologic conditions which DFG believes would meet the needs of trout in Lee Vining Creek. DFG biologist Gary Smith testified that the recommended flows are minimum instantaneous flow recommendations. DFG recommends maintaining either the specified flows or the natural flow, whichever is less. (RT XXXIX, 9:13-9:16.) In this case, the inflow to the LADWP conduit diversion facility is considered to be the natural flow. The DFG instream flow recommendations are measured as releases from the LADWP conduit diversion facility to Lee Vining Creek.

The criteria used by DFG to develop streamflow recommendations for brown trout in lower Lee Vining Creek for dry hydrologic years are described as follows:

(a) Provide 90 percent of maximum spawning habitat from October 1 through December 31;
(b) Maintain spawning streamflows from January 1 through March 31; and,
(c) Provide 80 percent of maximum adult habitat from April 1 through September 30. (DFG 54, p. 161, Table 34.)

DFG considered that the availability of adult and spawning habitat was a limiting factor. Consequently, providing habitat for adults and spawning life stages was emphasized in order to develop a viable and dynamic self-sustaining resident brown trout fishery. The period of the year that adult habitat is a limiting factor is from April 1 through September 30. Spawning of brown trout generally occurs during the months of October through December. Maintenance of the spawning flow regime from December through April would provide a minimum flow for adults during winter conditions and also provide protection of the redds until all fry have emerged.

Weighted useable area/streamflow relationships for fry, juvenile, adult and spawning brown trout were developed using the physical habitat simulation model (PHABSIM) within the IFIM model technique. The results reported as weighted useable area (WUA), in totals for the entire lower Lee Vining Creek, are found in DFG Exhibit 55. (DFG 55, pp. 142-147, Tables B-5 to B-8.) The results of the WUA analysis for adult and spawning life stages are presented in Tables 2 and 3 below:

TABLE 2: ADULT BROWN TROUT WEIGHTED USEABLE AREA (WUA) LEE VINING CREEK

WUA SQ FT.	CFS	PERCENTAGE
65,495	95	100%
58,946	54	90%
52,396	37	80%
45,846	25	70%
39,297	20	60%

TABLE 3: SPAWNING HABITAT WEIGHTED USEABLE AREA (WUA) LEE VINING CREEK

WUA SQ FT.	CFS	PERCENTAGE
11,405	40	100%
10,264	25	90%
9,124	20	80%
7,983	15	70%
6,843	13	60%

Examination of the weighted useable area/streamflow relationships presented in Table 2 indicates that habitat for adults increases slowly as flows increase above 37 cfs. Spawning flows of 25 cfs for October 1 through March 31 provide 90 percent of the maximum WUA for spawning while at the same time providing 70 percent of the maximum WUA for adults from January through March 31. The limited availability of spawning habitat substantiates the need to provide this particular kind of habitat in all hydrologic year types in order to ensure the continuation of the fishery. The DFG criteria indicate that DFG's target is to maintain 90 percent of spawning habitat and 80 percent of adult habitat. (DFG 54, p. 161.) Exhibit DFG 54 explains that providing 80 percent to

100 percent of habitat is the target for all life stages of brown trout in Lee Vining Creek. (DFG 54, p. 160.)

In discussing findings from other researchers, Dr. Tom Hardy, a fishery biologist testifying on behalf of LADWP, testified that "...no objective criteria has been validated to guide investigators on what percentage reduction of optimal habitat represents a significant impact or at what exceedence value associated with either optimal or median habitat represents adequate protection for the aquatic resources." (LADWP 132, pp. 2-3.) Dr. Hardy testified that several instream flow studies that he had participated in targeted a range of 80 percent to 85 percent of the maximum WUA as optimal habitat conditions. (LADWP 17, p. 58.) The LADWP Mono Lake Management Plan recommends flows of 15 cfs from October 1 to March 31 which corresponds to 68 percent of the maximum WUA for spawning and 56 percent of the maximum WUA for adults. (LADWP 53, p. 40 Table A.) The 25 cfs figure for April 1 through September 30 corresponds to 70 percent of the maximum WUA for adults. Thus, the LADWP plan suggests flows which produce less WUA than recommended by DFG and less than applied in several other studies in which Dr. Hardy participated.

LADWP did not revise its recommendation of the flows needed for maintenance of the fishery, but its revised Mono Lake Management Plan recommended a revised flow regime based on the need for increased flows to maintain the water level in Mono Lake. The flows in the revised management plan range from 20 to 35 cfs from April through September, which correspond to a range of approximately 64 percent to 80 percent of the maximum WUA for adult brown trout. With the exception of the months of June and July, the instream flow recommendations of the revised LADWP Mono Lake Management Plan are below the percentages recommended by DFG.

The criteria DFG used to develop streamflow recommendations for brown trout in lower Lee Vining Creek for normal hydrologic years include:

(a) Provide 100 percent of maximum spawning habitat from October 1 through December 31;
(b) Maintain spawning streamflows from January 1 through March 31; and
(c) Provide 90 percent of maximum adult habitat from April 1 through September 30. (DFG 54, p. 162, Table 35.)

A flow of 40 cfs from October 1 through March 31 would provide 100 percent of the maximum WUA for spawning and 80 percent of the maximum WUA's for adults. A flow of 54 cfs would provide 90 percent of the maximum WUA for adults. (Tables 2 and 3 above.)

The criteria DFG employed to develop streamflow recommendations for brown trout in lower Lee Vining Creek for wet hydrologic years include:

(a) Provide 100 percent of maximum spawning habitat from October 1 through December 31;
(b) Maintain spawning streamflows from January 1 through March 31;
(c) Provide 90 percent of adult habitat during April and September, to consider the needs of late emerging fry, the seasonal transition in streamflow and to simulate natural conditions; and,
(d) Provide 100 percent of maximum adult habitat from May 1 through August 31. (DFG 54, p. 161, Table 34.)

Testifying on behalf of NAS&MLC, Mr. Trihey stated that "winter streamflows between 20 and 40 cfs, and summer streamflows between 40 and 100 cfs, would be very compatible with the restoration work completed thus far on Lee Vining Creek." (NAS&MLC 104, p. 2.) Routine flows above 60 cfs begin to exceed velocities preferred by trout in Lee Vining Creek downstream of LADWP's diversion. However, at flows above 60 cfs, it would be beneficial to rewater two of the ancillary channels in order to provide refuge habitat from high stream velocities. These two ancillary channels are the ancillary channel which parallels Highway 120 in DFG study reach segment 2 and the ancillary channel in DFG study segment 3 referred to by the Restoration Planning Team as channel 3A-4. (DFG 54, NAS&MLC 125.) If flows above 160 cfs are to occur frequently during the next 10 to 15 years, then spawning gravels in segment 1 should be periodically checked and replaced as needed. Such gravels were naturally deposited in segment 1 prior to 1941, but the LADWP diversion dam stopped this natural process. (NAS&MLC IX, p. 6.)

The two instream flow recommendations provided to the SWRCB are those in DFG's Lee Vining Creek Stream Evaluation Report 93-2 (DFG 54 & 55) and the flows described in the revised LADWP Mono Lake Management Plan. The DFG report recommended instream flows to maintain fish in good condition pursuant to Fish and Game Code Sections 5937 and 5946. (DFG 3, p. 4.) The DFG's instream flow recommendations were also presented as flows needed to re-establish and maintain the conditions that benefitted the fishery prior to Los Angeles' diversions. (RT XX, 71:12-71:15.) DFG's study was based upon data collected utilizing the previously described IFIM and PHABSIM.

The LADWP recommendation was based upon evaluation of flows needed to maintain the fishery, historic hydrology, past operational practices and the need for additional flows to meet Mono Lake level objectives. In contrast to the DFG flow recommendations, LADWP recommended the same flows for all hydrologic year types. Although the flows recommended by LADWP would sustain a fishery at some level in Lee Vining Creek, the SWRCB concludes that those flows would not be sufficient to reestablish and maintain the fishery that existed prior to LADWP's diversion of water.

During wet hydrologic years, DFG recommended an increase in the May, June, July and August flows from 54 cfs to 95 cfs. (See Table 1 above.) The rationale, described in DFG Exhibit 54, used for the selection of this increase is to provide 90 percent to 100 percent of the maximum WUA for adult brown trout, 74 percent to 82 percent of the maximum fry habitat, 97 percent to 98 percent of the maximum juvenile habitat and to provide 100 percent of the maximum WUA for spawning.

LADWP argued that providing 80 percent to 85 percent of the maximum WUA would maintain a viable fishery and that it is not appropriate to select 100 percent of the maximum WUA. Instead, LADWP contends it is more appropriate to select the point of change where a significant increase in instream flow results in small increases in habitat. (LADWP 17, p. 58.)

The instream flow requirements established in this decision for May through August of wet hydrologic years are different than the DFG and LADWP recommendations. Examination of the flows associated with 90 percent and 100 percent of the maximum WUA for adult brown trout suggests that a significant flow increase is required to gain 10 percent in WUA. Ninety percent of WUA is provided at a flow of 54 cfs, whereas 100 percent of WUA would require 95 cfs. A reduction of flow from 95 to 54 cfs actually results in a slight increase in useable habitat for juvenile trout which are also present during the April through September period.

In his written testimony, Mr. Trihey concludes that "...the restoration treatments implemented thus far will provide good to very good fish habitat (e.g., depth and velocity for adult and juvenile fish) over a broad range of streamflows." (NAS&MLC 1X, p. 2.) A minimum instream flow requirement of 54 cfs for April through September would provide 90 percent of the maximum WUA for adults and 98 percent of the maximum WUA for juveniles. In combination with the restoration work already completed and the other fishery protection measures established in this decision, a flow of 54 cfs for April through September in both normal and wet years will be sufficient to restore and maintain the fishery that existed in Lee Vining Creek before LADWP began its Mono Basin diversions.

With the exception of the flow requirements for May through August of wet years, we adopt the fishery flow recommendations proposed by DFG for Lee Vining Creek. Based on the evidence presented we conclude that the following flows below the Lee Vining conduit diversion facility will maintain fish in good condition pursuant to Fish and Game Code Section 5937 and that the specified flows are needed to reestablish and maintain a fishery similar to that which existed in Lee Vining Creek prior to the export of water by LADWP.

TABLE 4: INSTREAM FLOW REQUIREMENTS FOR LEE VINING CREEK*

DRY HYDROLOGIC CONDITIONS-LEE VINING CREEK	
APRIL 1 THROUGH SEPTEMBER 30	37 CFS
OCTOBER 1 THROUGH MARCH 31	25 CFS
NORMAL HYDROLOGIC CONDITIONS-LEE VINING CREEK	
APRIL 1 THROUGH SEPTEMBER 30	54 CFS
OCTOBER 1 THROUGH MARCH 31	40 CFS
WET HYDROLOGIC CONDITIONS-LEE VINING CREEK	
APRIL 1 THROUGH SEPTEMBER 30	54 CFS
OCTOBER 1 THROUGH MARCH 31	40 CFS

* The instream flow requirements are the flows specified in the table or the inflow to LADWP's point of diversion, whichever is less.

5.1.3 *Channel Maintenance and Flushing Flows*

The DFG channel maintenance and flushing flow recommendations for Lee Vining Creek were presented by Dr. G. Mathias Kondolf in DFG Exhibit 170, later superseded by DFG Exhibit 170A. Dr. Kondolf's written testimony described the scope of his research in the Mono Basin. (DFG 11.) The result of his reseach on Lee Vining Creek is included in the Stream Evaluation Report on Lee Vining Creek prepared by Aquatic System Research. (DFG 54 and 55.) DFG's Exhibit 170 proposed a specific channel maintenance and flushing flow requirement for dry, normal and wet hydrologic conditions. The revised exhibit (DFG 170A) reflects a revised ramping flow recommendation of 20 percent maximum change in streamflow per 24-hour period during the ascending flow change and a 15 percent maximum change per 24 hour period during the descending flow. (RT XXXIX, 87:21-88:7.) The ramping rate recommendation for Lee

Vining Creek takes into account the availability of upstream flows and LADWP's inablity to regulate flows in Lee Vining Creek through release of water from storage. Table 5 presents DFG's channel maintenance and flushing flow recommendations for Lee Vining Creek for the different hydrological year types.

TABLE 5: CHANNEL MAINTENANCE & FLUSHING FLOW REQUIREMENTS LEE VINING CREEK

HYDROLOGIC CONDITION	REQUIREMENT
DRY YEAR	NO REQUIREMENT
NORMAL YEAR	160 CFS FOR A MINIMUM OF THREE DAYS DURING MAY, JUNE OR JULY
WET YEAR	160 CFS FOR 30 CONSECUTIVE DAYS DURING MAY, JUNE OR JULY
RAMPING RATE - 20% CHANGE DURING ASCENDING FLOW AND 15% DURING DESCENDING FLOWS PER 24 HOURS	

The ramping requirement applies to changes in flow made by LADWP. LADWP is not required to compensate for natural fluctuations in flow.

Testifying on behalf of LADWP, Dr. Robert Beschta acknowledged that ramping rates should be developed to prevent exceptionally rapid changes in flows and that the occurrence of peak flows of varying timing and magnitude should also be captured in the flow regimes for Lee Vining Creek. (LADWP 9, Section 2, p. 23.) The LADWP proposal for channel maintenance and flushing flows for Lee Vining Creek is set forth in LADWP Exhibit 133, Table 2.

Witnesses testifying on behalf of DFG and LADWP both acknowledged the need for and provided recommendations regarding channel maintenance and flushing flows. LADWP provided little testimony in support of the numbers recommended in its Management Plan for channel maintenance and flushing purposes. The explanation provided in support of the DFG recommendation was more detailed and specific regarding the procedures used to develop the recommendation. Consequently, for purposes of this decision, the SWRCB adopts the channel maintenance and flushing flow requirements for Lee Vining Creek below the LADWP diversion facility as proposed by DFG and as set forth in Table 5 above. The justification for this requirement is based upon the documentation provided by DFG, NAS&MLC and LADWP. (DFG 168 and 170A; NAS&MLC 1X; and LADWP 9.)

5.1.4 *Additional Measures to Assist Restoration of Pre-Project Fishery*

The long period of little or no flow in the four Mono Basin streams from which LADWP diverts water resulted in significant losses of riparian vegetation and other deterioration of channel conditions. In addition to testimony regarding recommended flow regimes needed for fishery habitat and channel maintenance, there was considerable evidence presented regarding the potential need for other measures which would assist in restoring the four streams. During the period of the preliminary injunction, considerable restoration work on Lee Vining Creek has already been completed under the supervision of the Restoration Technical Committee at the direction of the El Dorado County Superior Court.

Mr. Trihey, testifying on behalf of NAS&MLC and Cal Trout, described the extensive restoration treatment performed by Trihey and Associates under the direction of the Restoration Technical Committee. These treatments are described in a number of NAS&MLC exhibits. (NAS&MLC 106, 107, 108, 110, 111, 112, 115, 116, 119, 120, 123, 125, 126, 127, 128, 129, 130, 131, 132, 136, 175, 217.) Cal Trout also submitted many of these same exhibits. During his testimony, Mr. Trihey summarized the treatments that had been completed at the time of the hearing. He suggested that the restoration work completed thus far on Lee Vining Creek has significantly improved the amount and quality of the fish habitat in the portion of the stream affected by LADWP diversions. (NAS&MLC 1Y, p. 17.)

As mentioned previously, Mr. Trihey's written testimony states that the restoration treatments implemented by the time of the hearing "will provide good to very good fish habitat (e.g., depth and velocity for adult and juvenile fish) over a broad range of stream flows." (NAS&MLC 1x, p. 2.) Mr. Trihey indicated that, with completion of a few minor tasks, the stream will do well in time. (RT XXVIII, 21:20-22:12.)

The additional treatments recommended by Mr. Trihey to complete the restoration of the conditions that benefitted the prediversion fishery on Lee Vining Creek include the following:

> Segment 1--minor improvements to boulder weirs which were installed to hold spawning gravel in place during periods of channel maintenance flows, removal of willows from a developing side channel at restoration site LV 1.6, and replacement of approximately 300 cubic yards of spawning gravel at restoration sites LV 1.1, 1.4, 1.6 and LV 1.7;
>
> Segment 2--no further work is required;
>
> Segment 3--add approximately 100 cubic yards of spawning gravel to rewatered channels, place and anchor large woody debris along the main channel, remove excess sediment deposits from the B-1 channel, develop pool habitat in segment 3-d and implement phase II of the revegetation plan. (NAS&MLC 1Y, pp. 17-18.)

LADWP presented testimony by Dr. Beschta that the most important restoration activity for Lee Vining Creek is the return of continuous flows to the creek. The elimination of grazing in the riparian corridor and the reestablishment of streamflows has created conditions which are allowing the successful establishment and growth of riparian vegetation. Dr. Beschta believes that structural approaches to restoration provide little functional improvement to stream or riparian systems and may actually be counterproductive to providing sustainable fisheries habitat. The only structural modification he recommended was the construction of a sediment bypass system at the Lee Vining Creek diversion. He recommended that the flows released should: mimic the undisturbed flow regime; include ramping constraints; and that the minimum flow designed for the fishery should always be allowed to bypass the diversion. (LADWP 9, Section 2, pp. 22-23, 39.)

Restoration which occurs through natural processes is likely to be less dependent upon continued human intervention. In some situations, however, active intervention is necessary in order to restore conditions that benefitted the fishery in Lee Vining Creek. The record supports the conclusion that, in addition to the flow requirements discussed above, the following measures should be undertaken to restore and maintain in good condition the fishery that existed in Lee Vining Creek prior to the diversion of water by LADWP:

1. A sediment bypass system should be constructed at the Lee Vining Creek diversion.

2. Livestock grazing should be prohibited within the lower Lee Vining Creek riparian corridor for a minimum of ten years from the date of this order. Any resumption of grazing in the future should be subject to approval by the Chief of the Division of Water Rights of a plan prepared by LADWP in consultation with DFG.

3. Boulder weirs as described by Mr. Trihey in NAS&MLC Exhibit 1Y should be anchored sufficiently to hold the spawning gravel in place during the anticipated channel maintenance and flushing flows.

4. Two auxiliary flood flow channels should be reopened. The auxiliary stream channel that parallels Highway 120 should be reconnected to the main channel. The channel described by the Restoration Planning Team as 3A-4 should also be reconnected to the main channel. The alteration of the stream and the auxiliary channels should be kept at a minimum in order to minimize disturbance of the riparian area.

5. LADWP should evaluate the need for spawning gravel distribution in Lee Vining Creek below the LADWP diversion facility.

6. Vegetation disturbed by construction for any of the restoration activities required by this order should be restored. Revegetation should commence as soon as construction activities have been completed.

7. LADWP should install a continuous recording device satisfactory to the Chief of the Division of Water Rights to measure the flow at the Lee Vining Creek diversion and the flow in the stream immediately below the Lee Vining Creek diversion.

8. LADWP should consult with DFG regarding the revegetation necessary to maintain fish in good condition in Lee Vining Creek.

The installation of a continuous flow recording device and the prohibition of grazing in the riparian corridor can be implemented without the need for a lengthy planning period. The other measures specified above should be addressed in the stream restoration plan required to be prepared under the provisions of this decision.

5.2 Walker Creek

5.2.1 *Pre-Project Conditions*

In comparison to amount of evidence presented regarding Lee Vining and Rush Creeks, very little information was presented concerning pre-1941 conditions on Walker Creek. DFG's recommendations for instream flows and restoration requirements on Walker Creek are presented in the Walker Creek Stream Evaluation Report 92-1, Volumes 1 and 2. (DFG 56 and 57.)

The descriptions and accounts of the pre-1941 fishery are limited to brief descriptions provided by Eldon Vestal in his written testimony as it related to Rush Creek. (CT 5.) Mr. Vestal testified that both Parker Creek and Walker Creek were continuous in their natural condition, especially during wetter years. Both of these streams provided important nursery and breeding areas for Rush Creek, as well as supporting a local fishery. (CT 5, p. 14.) The descriptions of pre-1941 conditions on Walker Creek discussed in DFG Exhibit 56 were collected from documents and transcripts of proceedings in the El Dorado County Superior Court. (DFG 56, p. 20, citing Reporter's Transcripts of proceedings on May 3 and 4, 1990.)

Walker Creek was impacted by grazing and irrigation prior to the diversion of water for export by LADWP in 1941. The continued grazing and irrigation diversions, combined with the export of water beginning in 1941, severely degraded the aquatic and riparian environments. Complete diversions of the entire streamflow for export and irrigation occurred several months annually. (DFG 56, p. i.)

Walker Creek was planted with fish in the early 1900s under intermittent flow conditions from in-basin irrigation practices. The fishery continued to exist near the confluence with Rush Creek, as water was maintained in this segment by accretion from springs in the lower reaches. Brook trout and Lahonton cutthroat trout were introduced to Walker Creek in 1932 and 1933, in addition to brown trout, which continued to be planted in Rush Creek through about 1942. (DFG 56, p. 8.) The Walker Creek fishery endured until the mid-1950s under intermittent streamflow conditions. (DFG 56, p. 8.)

There is limited information available regarding the pre-project fishery that existed on Walker Creek. The record indicates that Walker Creek supported a limited trout fishery, the extent of which is unknown. The fishery may have naturally experienced periodic dewatering of the main stream channel but fish were able to move upstream or downstream into Rush Creek as instream flows subsided.

5.2.2 *Instream Flows for Fishery Protection*

DFG prepared the Walker Creek Instream Flow Report 92-1 in cooperation with LADWP. (DFG 56 and DFG 57.) Ebasco Environmental (Ebasco) of Sacramento was jointly selected by DFG and LADWP to conduct the investigation. The purpose of the study was to provide a plan to restore and optimize the presently degraded aquatic and riparian environments in lower Walker Creek.

DFG recommended the instream flows shown in Table 6, to maintain fish in good condition as required by Fish and Game Code Sections 5937 and 5946, until the stream reaches dynamic equilibrium and a more exact evaluation can be conducted. (DFG 3, p. 6.) In effect, DFG recommends continuation of the flow regime developed by the El Dorado Superior Court as set forth in its "Order Setting Interim Flows" dated June 14, 1990. LADWP recommended the same instream flows for protection of fish in Walker Creek. (LADWP 133, p. 2.) The recommended minimum flow requirements do not vary based on dry, normal or wet hydrologic year types. LADWP and DFG recommend that the minimum instream flow requirement be the flow specified in Table 6 or the inflow to the Walker Creek diversion facility, whichever is less. Based on the evidence presented, the SWRCB concludes that LADWP's licenses should be amended to include the minimum instream flow requirements specified in Table 6 below or the inflow to the Walker Creek diversion facility, whichever is less.

TABLE 6: WALKER CREEK INSTREAM FLOW REQUIREMENTS*

MONTH	STREAMFLOW
APRIL	6.0
MAY	6.0
JUNE	6.0
JULY	6.0
AUGUST	6.0
SEPTEMBER	6.0
OCTOBER	4.5
NOVEMBER	4.5
DECEMBER	4.5
JANUARY	4.5
FEBRUARY	4.5
MARCH	4.5

*All flows are in cubic feet per second (cfs)

5.2.3 *Channel Maintenance and Flushing Flows*

DFG presented channel maintenance and flushing flow recommendations for Walker Creek in DFG Exhibits 56 and 170A. The original recommendation was for 15 to 30 cfs initially for 1 to 4 days during the snowmelt season. During wet years flows up to 30 cfs could be released to provide more flushing. The original recommendation was later revised to the flows specified in Table 7. (DFG 170A.) The ramping rate applies only if LADWP is diverting water for export. If LADWP is not diverting water, flows may fluctuate in accordance with the inflow to the diversion facility. Based on the evidence provided in support of the channel maintenance and flushing flows recommended by DFG, the SWRCB concludes that the evidence supports adoption of a channel maintenance and flushing flow requirement for Walker Creek as recommended by DFG and as specified in Table 7 below.

TABLE 7: CHANNEL MAINTENANCE AND FLUSHING FLOWS FOR LOWER WALKER CREEK

HYDROLOGIC CONDITION	REQUIREMENT
DRY YEAR	No Requirement
NORMAL YEAR	15 to 30 cfs for 1 to 4 days between May 1 and July 31
WET YEAR	15 to 30 cfs for 1 to 4 days between May 1 and July 31
RAMPING RATE - 10% CHANGE IN STREAMFLOW PER 24 HOURS	

The ramping requirement applies to changes in flow made by LADWP. LADWP is not required to compensate for natural fluctuations in flow.

5.2.4 *Additional Measures to Assist the Restoration of the Pre-Project Fishery*

In 1990, the Walker Creek channel was modified in anticipation of rewatering pursuant to the Superior Court order setting interim flows. The modifications included removal of sediments and sod to increase channel capacity, closing of irrigation channels, and removal of channel obstructions such as soils, berms and small loose woody debris. Restoration of flow to Walker Creek in October 1990 created a continuous instream flow to the confluence with Rush Creek. DFG planted approximately 550 hatchery reared brown trout on November 29, 1990. By July 1991, both hatchery and wild brown trout were in Walker Creek downstream of the LADWP diversion facility. (DFG 56, p. 44.)

The DFG reported that the new streamflows, along with the use of livestock exclosure fences to protect riparian areas from grazing, allowed renewed growth of riparian vegetation which in turn provided cover and food supplies for fish. (DFG 56, p. 44.) The instream flow recommendation was intended to provide protective habitat until an instream flow study could be conducted and optimal flows were in place. The 1992 DFG report states:

> "Fish habitat from the conduit to Rush Creek has been provided for under the present flow regime (Ebasco Environmental 1991, 1992). This regime has supported healthy trout and diverse populations of aquatic invertebrates. Further, summer water temperatures have been within the optimum range for trout, and the

channel location appeared stable." (DFG 56, p. 118; DFG 64, p. 75.)

The restoration monitoring of Parker and Walker Creeks conducted by Ebasco for LADWP documented the physical and biological condition of these creeks before and after channel modifications and after rewatering. (DFG 64, p. 1.) Streamflows in Walker Creek measured directly below the diversion dam during January through March, and August through November, ranged from 1 to 13 cfs. During much of the year, flows were below the 6.0 cfs specified in the Superior Court order due to insufficient flows upstream of the diversion facility. (DFG 64, p. i.)

The monitoring program concluded that summer temperatures did not appear to pose a threat to self-sustaining brown trout populations. Several other factors may pose a threat to brown trout. These may include low winter flows and low water temperatures causing instream icing and the blockage of migration routes by the LADWP diversion facility, Parshall flumes and the Highway 395 culvert. Wild fish captured below the diversion facility indicate recruitment from upstream as these fish evidently passed through the conduit bypass pipe. However, the Parshall flumes and the Highway 395 culvert have prevented upstream migration from Rush Creek beyond those points. (DFG 64, p. 73.)

The Walker Creek study described several degraded conditions that are considered limiting to the fishery. (DFG 56.) The primary concern is the need for stable instream flows. Extensive livestock grazing has resulted in the loss of a significant amount of the riparian vegetation and the deterioration of the defined banks and channels. Dewatering of the main channel for irrigation stranded fish and deprived the riparian vegetation of water. Construction and operation of the diversion facility by LADWP blocked fish migration and trapped sediments and gravel.

DFG recommends the construction and operation of a bypass system around the LADWP diversion facility to restore fish passage, allow sediment and gravel transport, and to improve benthic drift. The design of this system should consider restoration of the contiguous stream condition while maintaining diversion capabilities. The bypass system should be designed to prevent the entrapment of fish in the bypass facility and should be screened to prevent fish from entering the conduit. (DFG 56, p. 56.) Until the bypass channel is operational, spawning gravel should be distributed below the diversion facility to maintain gravel distribution to downstream areas. (DFG 56, p. 57.)

To reduce entrainment of fish in the irrigation channels, all diversions should be screened to prevent fish from entering. To optimize habitat conditions, DFG recommended locating all intakes for irrigation at the diversion dam, screening the intake, and conveying irrigation water to the irrigation channels via rigid or flexible pipe. Relocating the intakes to the diversion facility would eliminate the need to operate and maintain instream diversion structures. (DFG 56, p. 57.)

The SWRCB concludes that Walker Creek is maintaining a self-sustaining brown trout fishery. The evidence indicates that the riparian vegetation has shown considerable improvement since the 1990 rewatering and the elimination of grazing. Any future revegetation programs should be based upon evaluation of site-specific needs. Fish passage is restricted by the Parshall flumes, the LADWP diversion dam, and the Highway 395 culvert. Fish populations are still low, possibly due to limited flows available as recovery from drought continues and due to blockage of upstream and downstream migration.

The plans described by DFG indicate that the need for implementing many of the potential restoration measures depends upon field conditions. Due to changing land use practices and ongoing restoration activities such as livestock exclosure fencing, aquatic and riparian losses are decreasing and the need for some of the restoration measures recommended in the DFG report may also decrease. In addition, construction of livestock exclosure fences and continued instream flows could increase natural regeneration and reduce the need for site revegetation.

Therefore, the DFG report concludes that need should be confirmed before implementing specific recommended restoration measures. (DFG 56, pp. 118-119.)

The evidence in the record supports the conclusion that, in addition to the flow requirements discussed above, the following other measures should be undertaken to restore and maintain in good condition the fishery that existed in Walker Creek prior to the diversion of water by LADWP:

1. A fish and sediment bypass system should be constructed around the Walker Creek diversion facility.

2. Livestock grazing should be prohibited within the lower Walker Creek riparian corridor downstream of the LADWP diversion point for a minimum of ten years from the date of this order. Any resumption of grazing in the future should be subject to approval by the Chief of the Divsion of Water Rights of a plan prepared by LADWP in consultation with DFG.

3. Minimum flows released to maintain the fishery should remain in the stream channel and should not be diverted for any use other than maintenance of the Walker Creek fishery.

4. Spawning gravel should be distributed below the LADWP Walker Creek diversion facility until such time as the bypass stream has become operational.

5. If LADWP continues irrigation from Walker Creek, then all irrigation facilities should be constructed and operated in a manner that does not not impede fish passage and screened to prevent fish from becoming stranded in irrigation channels.

6. Vegetation disturbed by construction for any of the restoration activities required by this decision should be restored and revegetation should commence as soon as construction activities have been completed.

7. LADWP should consult with DFG regarding the revegetation that may be necessary to maintain fish in good condition in Walker Creek.

8. LADWP should install and maintain continuous recording devices satisfactory to the Chief of the Division of Water Rights to measure the streamflow above the Walker Creek diversion facility and the flow immediately below the diversion facility.

The installation of a continuous flow recording device and the prohibition of grazing in the riparian corridor can be implemented without the need for a lengthy planning period. The other measures specified above should be addressed in the stream restoration plan to be prepared under the provisions of this decision.

5.3 <u>Parker Creek</u>

5.3.1 *Pre-Project Conditions*

As in the case of Walker Creek, relatively little evidence was presented regarding pre-1941 conditions on Parker Creek. DFG's recommendations for instream flows and restoration measures for Parker Creek are presented in the Parker Creek Stream Evaluation Report 92-2, Volumes 1 and 2, dated December 1992, prepared by Ebasco Environmental. (DFG 58 and DFG 59.)

Prior to the diversion of water by LADWP in 1941, Parker Creek supported a trout fishery. The riparian corridor was typically willow thickets and deciduous hardwood forest. Ebasco used 1929 aerial photographs to determine the extent of the pre-diversion riparian corridor. These photographs were compared to 1990 aerial photographs to determine the gains or losses in the riparian corridor following the start of water diversions by LADWP.

The pre-1941 aquatic environment was degraded by extensive livestock grazing and water diversions for irrigation. (DFG 58, pp. 1-3; LADWP 9, Section 2 pp. 21-22.) Prior to 1941, Parker

Creek was planted with brown trout, Lahonton cutthroat trout and brook trout. The fishery continued to exist with intermittent flow conditions through the 1950s. (DFG 58, p. 8.) Parker Creek was rewatered in 1990, and shortly thereafter it was stocked with brown trout by DFG.

5.3.2 *Instream Flows for Fishery Protection*

DFG prepared the Parker Creek Instream Flow Report 92-2 in cooperation with LADWP. (DFG 58.) Ebasco Environmental (Ebasco) of Sacramento was jointly selected by DFG and LADWP to perform the investigation. The objectives of the study were to develop a plan to restore and optimize the degraded aquatic and riparian environments of lower Parker Creek. From 1940 to 1990, the streamflow was diverted at the LADWP diversion facility, and the downstream channel remained dewatered for several months annually (DFG 58, p. i.) Except during periods of very high natural runoff or local irrigation, the annual dewatering of Parker Creek eliminated both aquatic habitats and biological resources, and desiccated riparian habitats. (DFG 58, p. 2.)

DFG recommended the instream flows shown in Table 8 to maintain fish in good condition as required by Fish and Game Code Section 5937 until the stream reaches dynamic equilibrium and a more exact evaluation can be conducted. (DFG 3, p. 6.) LADWP recommended the same instream flows as DFG. (LADWP 133, p. 2.) As in the case of Walker Creek, the minimum flows recommended by DFG are the same as the minimum flows required by the El Dorado Superior Court in its "Order Setting Interim Flows" dated June 14, 1990. The recommended flow requirements do not vary based on dry, normal or wet hydrologic year types. LADWP and DFG recommend that the minimum flow requirements be the flow specified in Table 8 below or the inflow to the Parker Creek diversion facility, whichever is less. Based on the evidence presented, the SWRCB concludes that LADWP's licenses should be amended to include the minimum instream flow requirements specified in Table 8 or the inflow to the Parker Creek diversion facility, whichever is less.

TABLE 8: PARKER CREEK INSTREAM FLOW REQUIREMENTS*

MONTH	STREAMFLOW
APRIL	9.0
MAY	9.0
JUNE	9.0
JULY	9.0
AUGUST	9.0
SEPTEMBER	9.0
OCTOBER	6.0
NOVEMBER	6.0
DECEMBER	6.0
JANUARY	6.0
FEBRUARY	6.0
MARCH	6.0

*All flows are in cubic feet per second (cfs)

5.3.3 *Channel Maintenance and Flushing Flows*

DFG presented its initial channel maintenance and flushing flow recommendations for Parker Creek in DFG Exhibits 3 and 58. The original recommendation of 25 to 40 cfs for one to four days each year was later revised to the flows specified below in Table 9. (DFG 170A.) The ramping rate applies only if LADWP is diverting water for export. If LADWP is not diverting water, flows may fluctuate in accordance with the inflow to the diversion facility. If LADWP is diverting water, the ramping rate shall be a 10 percent change in streamflow per 24 hours. (DFG 170A.) Based on the evidence provided in support of the channel maintenance and flushing flows recommended by DFG, the SWRCB concludes that the evidence supports adoption of a channel maintenance and flushing flow requirement for lower Parker Creek as recommended by DFG and as specified in Table 9 below. (DFG 168 and 170A.)

TABLE 9: CHANNEL MAINTENANCE AND FLUSHING FLOWS FOR LOWER PARKER CREEK

HYDROLOGIC CONDITION	REQUIREMENT
DRY YEAR	NO REQUIREMENT
NORMAL YEAR	25 to 40 CFS FOR 1-4 DAYS BETWEEN MAY 1 AND JULY 31
WET YEAR	25 to 40 CFS FOR 1-4 DAYS BETWEEN MAY 1 AND JULY 31
RAMPING RATE - NOT TO EXCEED A 10% CHANGE IN STREAMFLOW PER 24 HOURS	

The ramping requirement applies to changes in flow made by LADWP. LADWP is not required to compensate for natural fluctuations in flow.

5.3.4 *Additional Measures to Assist the Restoration of Pre-Project Fishery*

In 1990, the Parker Creek channel was modified in anticipation of rewatering pursuant to the Superior Court order setting interim flows. The modifications included removal of sediments and sod, closing of irrigation diversion channels, and removal of channel obstructions such as the Parker Plug, soils, berms and small loose woody debris. Restoration of flows to Parker Creek in October of 1990 created a continuous instream flow to the confluence with Rush Creek. DFG planted brown trout in Parker Creek below the LADWP diversion facility on November 29, 1990 and August 8, 1991. (DFG 58, p. 45.) DFG reported that the new streamflows, along with the use of livestock exclosure fences to protect riparian areas from grazing, allowed renewed growth of riparian vegetation which in turn has provided cover and food supplies for fish.

The Parker Creek report describes various degraded conditions which could be limiting for the fishery. The primary concern is the need for stable instream flows. Extensive livestock grazing resulted in the loss of much of the riparian vegetation and the deterioration of the defined banks and channels. Irrigation also added to the degradation of Parker Creek by dewatering the main channel and stranding fish. (DFG 58.)

The channel modifications completed prior to the rewatering of Parker Creek in 1990 improved the aquatic and riparian habitat. However, if some of the stable woody debris had not been previously removed as part of that process, it would have created fish habitat structures upon rewatering. (DFG 58, p.119.) Natural recovery of the aquatic and riparian habitat was apparent in 1991, approximately one year after the channel had been rewatered. Nevertheless, degradation of aquatic habitat remained due to a number of factors. Among the problems identified in the DFG report was trapping of sediment (including spawning gravels) at the diversion facility, and possible entrainment of fish at the diversion conduit. The conduit diversion dam, Parshall flumes and the Highway 395 culvert remain as barriers to fish migration. (DFG 58, p. 119.)

The restoration monitoring of Parker and Walker Creeks conducted by Ebasco for LADWP documented the physical and biological condition of these streams before and after channel modifications, and after rewatering. (DFG 64, p. 1.) Mean daily streamflows between November 19, 1990 and October 31, 1991 downstream of the Parshall flume on Parker Creek ranged from 0.5 to 30.9 cfs. During much of the year, flows were below the 9.0 and 6.0 cfs specified in the Superior Court order due to insufficient flows upstream of the diversion facility. (DFG 64, p. 51.)

The Ebasco monitoring program concluded that there is some recruitment of wild fish from the upstream population to lower Parker Creek. The Parshall flume and the Highway 395 culvert have inhibited upstream movement of fish from Rush Creek into Parker Creek beyond those structures. (DFG 64, p. 73.) The fish populations were sampled in lower Parker Creek in 1991. The results indicated an absence of hatchery reared trout and a low number of wild trout. (DFG 64, p. 63 Table 3-11.) There is some evidence that low winter flows in Parker Creek in combination with low water temperatures may have led to development of instream ice conditions reducing the survival of hatchery fish planted in Parker Creek in 1990. (DFG 64, p. 73.) Monitoring of water temperatures in Parker Creek indicated that mean daily temperatures did not exceed 15.5° C, and the highest maximum temperature recorded is 17.5°C which is below the upper limit of the optimal temperature range for brown trout of 19.0° C. (DFG 64, p. 60, Table 3-10; DFG 64, p. 73.)

DFG recommends the construction and operation of a bypass system around the LADWP diversion facility to restore fish passage and allow sediment bypass. The design of this system should consider restoration of the contiguous stream condition while maintaining diversion capabilities. The bypass system should be designed to prevent the entrapment of fish in the bypass facility and should be screened to prevent fish from entering the conduit. (DFG 58, p. 57.) DFG also recommends removal of fish migration barriers and revegetation for areas not experiencing natural habitat recovery. (DFG 58, p. 119.)

As in the case of Walker Creek, DFG advises that the need for implementing many of the restoration measures it has identified depends upon field conditions. Due to changing land use practices and ongoing restoration activities such as livestock exclosure fencing, aquatic and riparian losses are decreasing and the need for some of the restoration measures recommended in the DFG plan may also decrease. DFG also advises that construction of livestock exclosure fences and continuation of instream flows could increase natural regeneration and reduce the need for site revegetation. Therefore, the DFG report concludes that need should be confirmed before implementing specific recommended restoration measures. (DFG 58, pp. 118-119.)

Based on the evidence presented, the SWRCB concludes that Parker Creek supported a brown trout fishery prior to the export of water by LADWP. Although extensive grazing existed in the riparian corridor, the riparian corridor was more extensive than that which exists today. Natural recovery has begun since the rewatering of Parker Creek was required by court order in 1990. Restoration activities such as removal of the Parker plug, channel modification prior to rewatering, livestock exclosure fences, maintenance of continuous streamflows and planting of brown trout have resulted in a significant improvement of the aquatic and riparian habitat. The evidence in the record supports the conclusion that, in addition to the flow requirements specified above, the following measures should be undertaken to restore and maintain in good condition the fishery as it existed in Parker Creek prior to the diversion of water by LADWP:

1. A fish and sediment bypass system should be constructed around the Parker Creek diversion facility.

2. Livestock grazing should be prohibited within the Parker Creek riparian corridor downstream of the LADWP diversion point for a minimum of ten years from the date of this order. Any resumption of grazing in the future should be subject to approval by the Chief of the Divsion of Water Rights of a plan prepared by LADWP in consultation with DFG.

3. Minimum flows released to maintain the fishery should remain in the stream channel. No diversion or use of this water should be authorized for any use other than maintenance of the Parker Creek fishery.

4. Spawning gravel should be distributed below the LADWP Parker Creek diversion facility until such time as the bypass stream has become operational.

5. If LADWP continues irrigation from Parker Creek, then all irrigation facilities should be constructed and operated in a manner that does not not impede fish passage and screened to prevent fish from becoming stranded in irrigation channels.

6. Vegetation disturbed by construction for any of the restoration activities required by this order should be restored and revegetation should commence as soon as construction activities have been completed.

7. LADWP should consult with DFG regarding revegetation that may be necessary to maintain fish in good condition in Parker Creek.

8. LADWP should install and maintain continuous recording devices satisfactory to the Chief of the Division of Water Rights to measure the streamflow above the diversion facility and the flow immediately below the diversion facility.

Installation of a continuous flow recording device and the prohibition of grazing in the riparian corridor can be implemented without need for a lengthy planning period. The other measures specified above should be addressed in the stream restoration plan required to be prepared under the provisions of this decision.

5.4 Rush Creek

5.4.1 *Pre-Project Conditions*

Rush Creek is the largest tributary to Mono Lake. Numerous reports were submitted in these proceedings concerning stream and riparian conditions on Rush Creek prior to the diversion of water by the City of Los Angeles. (e.g., SWRCB 7; NAS&MLC 123, 125, 126, 133, 134, 136, 137, 264, and 265; CT 1, 5, 5B, 5S, and 8; and LADWP 1, 4, 7, 9, 15, 17, 19, 21, 43, 132, 136, 137, et al.) Trihey and Associates summarized a number of these documents in an attempt to describe the pre-1941 conditions on Rush Creek. (NAS&MLC 137.) The majority of the descriptions of the pre-project fishery are either the direct account of Eldon Vestal or they reference his testimony in the Superior Court or material he prepared for this proceeding.

Mr. Vestal's testimony indicates he was familiar with the Rush Creek fishery as it existed prior to the diversion of water by LADWP in 1941. His experience included a Test Stream Study on Rush Creek, review of the fish planting records for the region, and his overall experience in the Mono Basin. (CT 5, p. 8.) Mr. Vestal described DFG's activities, including hatchery and egg collection operations on Rush Creek. (CT 5F, 5G.) He also described the type and quantities of fish that were present prior to 1941, testifying that "...Rush Creek produced among the largest and hardiest trout in the region." (CT 5, p. 11.) DFG began planting brown trout in the 1930s in response to local angling pressure. Mr. Vestal indicated that he regularly observed brown trout, averaging 13 to 14 inches, in lower Rush Creek. Rush Creek was a popular fishing attraction from the 1920s through the 1940s because of the quality fishing.

Dr. Beschta testified that pre-project stream and riparian conditions on Rush Creek were similar to those summarized by Trihey and Associates. (LADWP 9, p. 137.) His testimony differed with regard to the effects of irrigation practices, grazing, the physical description of the stream channel and the riparian vegetation. Based on his interpretation of historic photographs and field observations, Dr. Beschta concluded that Rush Creek occupied a sinuous single thread channel throughout most of its length with channel widths of 30 feet or less and pools likely to occur at meander bends or where flows interacted with the root masses of mature streamside vegetation. Dr. Beschta believes that changes in channel pattern below Indian Ditch indicate grazing was causing the channel to widen and shallow. Dr. Beschta's written testimony states that the general braiding of the channel and reduced streamside vegetation are definite indicators of channel instability, widening, and shallowing. (LADWP 137, p. 4.) Dr. Beschta believes that the multi-channels were mostly irrigation ditches and overflow channels which were not watered throughout the year.

Prior to export of water from the Mono Basin, water diverted for irrigation onto both sides of the bottomlands assisted in maintaining high densities of woody plants away from the main channel. The water diverted for irrigation or subsurface seepage caused the occurrence of several ponded areas alongside Rush Creek downstream of the Narrows. (LADWP 137, p. 4.) Extensive grazing pressure had caused significant changes to understory plants but the overstory remained intact. Channel banks and water quality had been impacted by livestock grazing, but widespread channel changes had not yet occurred. From the Narrows downstream to the Indian Ditch diversion, there were long, smooth meanders. (LADWP 137, p. 1.)

Anglers considered Rush Creek to be a very good trout stream, producing trout weighing 3/4 to 2 pounds fairly consistently. Aquatic and riparian habitat conditions differed considerably above and below the Narrows. The Narrows is a granitic dike crossing Rush Creek approximately midway between Grant Lake and Mono Lake. (NAS&MLC 125, p. 16.)

For study purposes, Mr. Trihey divided Rush Creek below Grant Lake into 5 segments: segments 1, 2 and 3 above the Narrows and segments 4 and 5 below the Narrows. Prior to LADWP's diversions, small clusters of Jeffery Pine grew along the stream corridor and a continuous ribbon of willow and cottonwood extended along much of the corridor from the historic Grant Lake to the Narrows. The riparian vegetation directly below Grant Lake (segment 2) has changed little since 1940. Prior to 1941, this segment had some streamflow during all months except during extreme drought winter periods. Seepage and ponded water in the historic Grant Lake and forebay prevented the channel from becoming entirely dry. (NAS&MLC 122.)

The upper portion of segment 3 also remained flowing most of the time. A small amount of water was contributed from seepage from A-Ditch and South Parker Creek. The middle reach of segment 3 was at times dry below B-Ditch to the confluence of Parker Creek. The lower segment 3 remained flowing most of the time gaining water from springs, and Parker and Walker Creeks, although very little contribution came from Parker and Walker Creeks during the irrigation season. The upper portion of segment 3 consisted of dense willows interspersed with pine trees. Also present were several cutoff meander bends and secondary channels. This area probably provided good habitat for fish. In addition, the secondary channels probably contributed to a reduction in streambed and streambank scouring during periods of high runoff by shunting a portion of the flood flow out of the main channel and onto a floodplain. It is uncertain whether or not these channels remained watered outside of the high flow period. (NAS&MLC 125, p. 17.)

In segment 4 downstream of the Narrows, Rush Creek opens into a broad, flat floored valley called the "bottomlands". Dr. Stine testified that the bottomlands were characterized by a wide and dense riparian corridor, wooded marshlands, wet meadows, ponded water, abundant springs and a system of narrow, steep-sided, low-gradient perennial channels. (NAS&MLC 1W.) The spring flow in the bottomlands was a combination of natural and artificially induced flows resulting from irrigation on the Cain Ranch and in the Pumice Valley with an average annual application of 30,000 acre-feet. The spring systems and the natural high water table supported dense stands of riparian vegetation. (NAS&MLC 122.) Mr. Vestal reported that springs provided lush watercress beds that produced important trout foods. (CT 5, p. 14.)

In segment 5, which is below the meadows described in segment 4, little if any spring flow occurred. Dikes had been constructed between the County Road and Mono Lake. The dikes formed ponds and freshwater marshy areas. These ponds provided habitat for large brown trout and waterfowl. (DFG 137.) The fish and wildlife habitat provided by these ponds was present only because of the construction of dikes to store water.

Segments 4 and 5 remained flowing most of the time. Water was contributed from springs, Parker and Walker Creeks and some irrigation return flow. The flow in many of the auxiliary channels was supported by return flow from irrigation and subterranean contribution from springs. (NAS&MLC 122.)

Prior to 1941, healthy stands of vegetation were commonly found along all reaches of Rush Creek. The riparian zone was generally characterized by a dense multilayered canopy of trees, shrubs and herbaceous plants. Approximately 271 acres of woody vegetation and 131 acres of meadows were present along Rush Creek in 1940. Prior to the export of water by LADWP, there were only localized impacts to riparian vegetation. The area around B-Ditch and the old Highway 395 crossing was degraded from construction of the highway and/or construction of B-Ditch. (NAS&MLC 122 and 137, p. 5-1.)

Based on the evidence in the record, the SWRCB concludes that the pre-1941 fishery in Rush Creek was predominately a self-sustaining brown trout fishery with some rainbow trout present. In the 1930s through the 1940s, the fishery was augmented with planted fish to offset heavy fishing pressure. The fisheries above and below the Narrows were considerably different. The grazing and irrigation practices in the area above the Narrows had degraded the habitat considerably. Lower Rush Creek also experienced damage from grazing and limited water supply, but maintained a higher quality fishery.

5.4.2 *Flows for Providing Fishery Habitat*

DFG submitted DFG Exhibits 52 and 53, Rush Creek Stream Evaluation Report 91-2, Volumes 1 and 2, which were prepared by Beak Consultants, Inc. (Beak) as a cooperative study funded by LADWP and DFG. This report is based on a comprehensive investigation which used the instream flow incremental methodology (IFIM) to determine instream flow requirements for brown trout in Rush Creek, based on fieldwork done in 1987. The study was comprised of investigative elements designed to identify instream flow needs and to provide a basis for flow recommendations. Flow recommendations were based upon habitat availability and historic flow, and were modified on the basis of stream channel stability and streambed mobility. Table 34 of the report presents flow recommendations for brown trout in lower Rush Creek during dry, normal and wet hydrologic years. (DFG 52, p. 107, Table 34.)

DFG's instream flow recommendations in this proceeding are set forth in an addendum to the report which presents revised instream flow recommendations for Rush Creek. (DFG 52, Addendum to "Instream Flow Requirements for Brown Trout, Rush Creek, Mono County, Volume 1," California Department of Fish and Game Stream

Evaluation Report 91-2.) The written testimony of Gary Smith explains DFG's rationale for revising the instream flow recommendations in the Beak report. (DFG 3, p. 3.) Mr. Smith explained that, prior to the publication of the 1991 report, a trout spawning gravel replenishment program was implemented on Rush Creek by the Rush and Lee Vining Creeks Habitat Restoration Technical Committee. In view of the gravel replenishment program, Mr. Smith testified that an upper limit of 60 cfs on recommended flows was no longer applicable. He went on to state that he used the information found in Tables 33 and 34 of DFG Exhibit 52, to develop revised instream flow regimes for releases at Mono Gate One for dry, normal and wet hydrological conditions, as shown in the addendum to the report. (DFG 3; DFG 52, pp. 105 and 107, Tables 33 and 34.) The primary difference is that the revised recommendation proposes higher flows for the months of May through September, in excess of the initial recommendation of 60 cfs for that period.

LADWP submitted two instream flow recommendations for Rush Creek. The initial recommendation was presented in the original LADWP Mono Lake Management Plan. As discussed in Section 5.1.1 above, the LADWP plan was revised and a new instream flow recommendation was presented which includes the minimum flows for the fishery and additional flows to protect Mono Lake. (LADWP 133, p. 2, Table 1).

Table 10 below shows the various instream flow recommendations for Rush Creek presented during the SWRCB proceedings, in addition to the interim flows established by the El Dorado County Superior Court and the flow requirements established in this decision. The flows represented in the column labeled "Beak" are the flow recommendations described in DFG Exhibit 52. (DFG 52, p. 107, Table 34.) The flow recommendations in the column labeled "DFG" are DFG's present recommendations as shown in the addendum to DFG Exhibit 52 and as described in DFG Exhibit 3. LADWP's original flow recommendations are shown in the column labelled "LADWP," and their revised recommendations are shown in the column labelled "LADWP Revised." (LADWP 53, Section 2,

p. 38; LADWP 133, p. 2, Table 1.) The interim flows set by the Superior Court are shown in the last column of the Table 10, and the flow requirements established in this decision are shown in the column labelled "SWRCB."

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TABLE 10: RUSH CREEK INSTREAM FLOW RECOMMENDATIONS/REQUIREMENTS*

HYDROLOGIC YEAR		MONTH	BEAK	DFG	SWRCB	LADWP	LADWP REVISED	INTERIM
	DRY	APRIL	35	35	31	30	30	40
		MAY	60	75	31	30	35	40
		JUNE	60	72	31	30	40	40
		JULY	45	45	31	30	40	40
		AUGUST	42	42	31	30	35	40
		SEPTEMBER	40	40	31	30	30	40
		OCTOBER	36	36	36	20	25	28
		NOVEMBER	30	30	36	20	25	28
		DECEMBER	30	30	36	20	25	28
		JANUARY	31	31	36	20	25	28
		FEBRUARY	32	32	36	20	25	28
		MARCH	34	34	36	20	25	40
	NORMAL	APRIL	59	59	47	30	30	40
		MAY	60	100	47	30	35	40
		JUNE	60	100	47	30	40	40
		JULY	60	100	47	30	40	40
		AUGUST	60	93	47	30	35	40
		SEPTEMBER	60	69	47	30	30	40
		OCTOBER	58	58	44	20	25	28
		NOVEMBER	40	40	44	20	25	28
		DECEMBER	40	40	44	20	25	28
		JANUARY	44	44	44	20	25	28
		FEBRUARY	48	48	44	20	25	28
		MARCH	52	52	44	20	25	40
	WET	APRIL	60	84	68	30	30	40
		MAY	60	100	68	30	35	40
		JUNE	60	100	68	30	40	40
		JULY	60	100	68	30	40	40
		AUGUST	60	100	68	30	35	40
		SEPTEMBER	60	100	68	30	30	40
		OCTOBER	60	93	52	20	25	28
		NOVEMBER	56	71	52	20	25	28
		DECEMBER	56	71	52	20	25	28
		JANUARY	57	57	52	20	25	28
		FEBRUARY	54	54	52	20	25	28
		MARCH	54	54	52	20	25	40

*All flows are in cubic feet per second (cfs)

Mr. Trihey suggested that with a range of streamflows from 30 to 100 cfs (DFG's recommendation) the treatments that are in place will work well. Channel flushing and maintenance flows of 350 cfs would result in minimal erosion of streambed and banks. He also indicated that opening up the historic channels would lessen the erosive effects, and that the reemergence of riparian vegetation would solidify the channel and provide good refuge habitat for fish during overbank flows, thus allowing even higher flows without injury to the fishery. (NAS&MLC 1X, p. 12.)

The instream flow recommendations developed by DFG were characterized as providing for the maintenance of the brown trout population in lower Rush Creek. Instream flow recommendations were based on the goal of attempting to maintain the median ("50% exceedence") brown trout habitat that would occur in lower Rush Creek, for each of three hydrologic year types, in the absence of water storage and diversion at Grant Lake. (DFG 52, p. 103.) DFG Exhibit 52 suggests that maintenance of median habitat for brown trout will maintain the fish population.

Initially, DFG's use of median values for flow recommendations was modified to respond to the concern that the transport of spawning size substrate will begin at 60 cfs thus reducing spawning habitat if flows were in excess of 60 cfs. The Beak study recommended restricting flows to 60 cfs to avoid potential uncompensated losses of spawning size substrate in reaches 2 and 3. (DFG 52, p. 106.) In addition, in order to restrict the exposure of redds (trout spawning nests), DFG limited the reduction of flows during the spawning period by averaging the median flows recommended for those months. Additional modification of the median flow recommendations was made in an effort to mimic the seasonal flow regime of water entering Grant Lake. Water temperature was determined not to be a limiting factor for the range of flows from 19 cfs to 100 cfs. Consequently, water temperature was not used as a criterion in developing DFG's flow recommendations.

DFG utilized different criteria for developing instream flow recommendations for Rush Creek than were used for Lee Vining Creek. In the case of Rush Creek, DFG's consultants selected instream flows which would provide median habitat values for each year type based on historic inflow to Grant Lake. For Lee Vining Creek and the Upper Owens River, however, DFG's consultants based their recommendations on flows needed to provide a specified percentage of the maximum habitat available. (RT XX 48:1-49:20; DFG 62, pp. 213-214.) When asked to explain the reason for the different approaches, Mr. Smith responded that:

> "...the major difference between Rush and Lee Vining Creeks is the presence of Grant Reservoir. There is an ability to capture runoff in that lake and meter it out sometime in the future. That ability does not exist on Lee Vining Creek. If the habitat duration approach had been used on Lee Vining Creek, there would be no mechanism, to maintain the median habitat discharge." (RT XX, 48:2-48:12.)

DFG's original instream flow recommendation for Rush Creek would have required the release of water stored in Grant Lake whenever inflow to Grant Lake is less than the recommended minimum flows. During rebuttal testimony, however, Mr. Smith explained that DFG's revised recommendations would require LADWP to:

> "...release the numerical flows listed in the Rush Creek addendum for wet and normal water runoff years, until such time the inflow to Grant Lake drops below the recommended values. And at that time the inflow would equal the recommendation. Our recommendation is that the inflow equal the outflow. Until the dry runoff year recommendations are reached, at which time we would recommend that storage be released to maintain dry year runoff flows, regardless of...runoff year type." (RT XXXIX, 8:24-9:12.)

The use of different types of criteria to develop instream flow recommendations for Rush Creek and Lee Vining Creek was based upon the assumption that LADWP would be required to release water from storage at Grant Lake if needed to meet the required flows. DFG's present proposal, however, would not require release of water from storage in Grant Lake, except to meet dry-year flow requirements.

In view of the limited role which release of stored water from Grant Lake would play in meeting DFG's revised flow recommendations, it is more appropriate to determine instream flow requirements for Rush Creek based on a percentage of available habitat as was done for Lee Vining Creek. Therefore, as in the case of Lee Vining Creek, the instream flow requirements for Rush Creek established in this decision are based upon the percentage of maximum measured habitat for the life stages of primary concern, as determined from the amount of Weighted Useable Area (WUA) at different flows. (RT XX, 48:1-49:20.)

There is general agreement that adult habitat and spawning habitat in Rush Creek are limiting. Thus, it is important to target these two life stages in establishing instream flow requirements. (DFG 52; LADWP 1 and 130; NAS&MLC 1X.) In order to ensure that instream flows provided for certain life stages do not cause severe reductions in available habitat for other life stages, it is also important to compare the effects on fry and juvenile habitat of flows designed to maintain adult and spawning habitat.

In the Lee Vining Creek and the Upper Owens River DFG studies, the maximum WUA for each of the targeted life stages were reached at a value below the highest simulated flow. This was also the case for the Rush Creek DFG study with the exception of adult habitat WUAs. The WUA for adult brown trout in Rush Creek continued to increase at the highest simulated flow of 100 cfs. A comparison of the adult habitat types indicates the Mono Gate One return channel was the greatest contributor of adult WUAs in the study area at flows above 45 cfs. (DFG 52, p. 43.) Extrapolation for adult habitat at flows above 100 cfs indicates a continued increase of adult habitat in the return channel. However, adult habitat in other reaches of the Rush Creek study peaks and begins to decline at simulated flows below 100 cfs. (DFG 52, pp. 41-45.)

Thus, the relationship between WUA and flow in the return channel is not consistent with the relationship between flow and WUA in a natural channel. The return channel did not exist in 1941. In establishing flow requirements intended to restore and maintain the pre-1941 fishery, it is appropriate to consider the relationship between WUA and flow in the natural stream channel. Consequently, the SWRCB bases its flow requirements upon the assumption that the maximum WUA for adult brown trout occurs at a flow of 100 cfs.

The criteria DFG applied in determining flows in Lee Vining Creek were that the targeted life stages should be provided 80 percent of the maximum WUAs during dry hydrologic years, 90 percent during normal hydrologic years and 100 percent during wet hydrologic years. Similarly, in developing flow requirements for Rush Creek, this decision sets flow requirements for each year type based on percentages of the maximum WUAs available for the limiting life stages of Brown trout in Rush Creek. The percentages of WUA were derived from the data developed in the DFG study. (DFG 52, p. 41, Table 13.)

DFG's recommended flows for April through September of dry hydrologic years are based on providing habitat for the adult life stage. The recommended flows range from 35 cfs in April, peak at 75 cfs in May, and descend monthly to 72 cfs, 45 cfs, and 42 cfs, continuing down to 40 cfs in September. A flow of 35 cfs provides 84 percent and 75 cfs provides 96 percent of the maximum WUA for the adult life stage in lower Rush Creek. Using the criteria DFG applied to Lee Vining Creek, it is desirable to provide a minimum of 80 percent of the maximum WUA for the adult life stage during dry year conditions. Providing 80 percent of maximum WUA for adult brown trout corresponds to a flow of 31 cfs in Rush Creek for the months of April through September.
Table 11 below shows the measured WUA values present for adult brown trout in Rush Creek at various flows.

TABLE 11: ADULT BROWN TROUT WEIGHTED USEABLE AREA (WUA) FOR RUSH CREEK

WUA SQ.FT.	CFS	PERCENTAGE
208,477	100	100%
198,053	68	95%
187,630	47	90%
166,782	31	80%
145,934	23	70%

The DFG spawning flow recommendations target the months of October through December and range from 30 cfs to 36 cfs. A flow rate of 30 cfs corresponds to approximately 71 percent of maximum WUA and 36 cfs corresponds to 80 percent of the maximum WUA for spawning. Therefore, providing 80 percent of the maximum WUA for spawning would require a flow of 36 cfs for October through December. In order to protect redds and emerging fry, the minimum flows in effect during the spawning period of October through December should also remain in effect during January through March.

TABLE 12: BROWN TROUT SPAWNING HABITAT WEIGHTED USEABLE AREA (WUA) RUSH CREEK

WUA SQ.FT.	CFS	PERCENTAGE
69,112	85	100%
65,656	52	95%
62,200	44	90%
55,289	36	80%
48,378	29	70%

Based on the above analysis, the SWRCB concludes that the minimum flow requirement for dry hydrologic years on Rush Creek should be 31 cfs for the months of April 1 through September 30 and 36 cfs from October through March. The dry year minimum flow requirements shall be be maintained, if necessary, by releases from storage until such time as the quantity of water in storage at Grant Lake declines to 11,500 acre-feet. Any time that Grant

Lake storage falls below 11,500 acre-feet (See Section 6.5 "Recreation") the instream flow requirement will revert to the dry year flow requirement or the inflow to Grant Lake, whichever is less.

The DFG recommended instream flow for Rush Creek during normal hydrologic conditions for the months of April through September ranges from 59 cfs to 100 cfs. A flow of 59 cfs corresponds to approximately 91 percent of the maximum WUA for adults and 100 cfs corresponds to 100 percent of the maximum WUA for adults. Applying the criteria utilized for Lee Vining Creek for this period (i.e., providing 90 percent of the maximum WUA) would result in a minimum flow of 47 cfs from April through September. Maintaining approximately 90 percent of the maximum WUA for spawning would require a flow of 44 cfs during the period of October through December. In order to protect redds and emerging fry, the minimum flow requirement should remain at 44 cfs from January through March.

Based on the analysis above, the SWRCB concludes that the minimum instream flow requirement for the protection of fish in Rush Creek during normal hydrologic years should be 47 cfs for the period April 1 through September 30 and 44 cfs for October 1 through March 31, or the inflow to Grant Lake, whichever is less.

During wet hydrologic years, DFG's recommended instream flows for Rush Creek are 84 cfs during the month of April, and 100 cfs for May through September. As discussed earlier in this section, the 100 cfs requirement was based upon the adoption of a gravel augmentation project by the Restoration Technical Committee. The Beak report indicates that flow in excess of 60 cfs may result in scouring and transporting spawning substrate through the system which would further reduce spawning habitat. (DFG 52, p. 106.) Mr. Smith testified, however, that following the gravel replenishment program established by the Restoration Technical Committee, the 60 cfs restriction was no longer applicable. (DFG 3, p. 3.)

At the time of the hearing, DFG had no information if the gravel replenishment program had worked, how often it would be necessary to add gravel, or how a monitoring program would be developed to evaluate the success of the gravel augmentation program. (RT XX, 72:21-75:9.) DFG did, however, recommend a monitoring program to evaluate the spawning gravel condition. (RT XX, 74:18-75:4.) Without a full understanding of the effects of 100 cfs on spawning substrate and what is required to implement a successful spawning gravel augmentation program, it would be inappropriate to require minimum flows for fishery protection which could reduce available spawning habitat.

Further, the Beak study (DFG 52 and 53) did not consider the contribution of water from Parker and Walker Creeks due to the fact that both streams were dry during the time that field data was collected. (RT XX 78:19-79:10.) Mr. Smith also testified that DFG did not consider the influence of these two streams when they developed the instream flow recommendation presented at the hearing. (RT XX, 78:19-80:1.) The minimum instream flow requirements for Parker and Walker Creeks, during the summer months, will provide additional flow at the conduit. The evidence is insufficient to determine how much of this flow will reach Rush Creek, but the contribution from Walker and Parker Creeks should increase the WUA for adults in lower Rush Creek. During October through March, the minimum instream flow requirements for Parker and Walker Creeks of 6.0 and 4.5 cfs, respectively, will also contribute to instream flows in lower Rush Creek.

Dr. Hardy testified that evaluation of the total WUA for each life stage should consider the point where the rapid increase in habitat begins to slow down and the continued increase of streamflow provides small increases in WUA for the particular life stage in question. Comparison of the adult WUA indicates that 90 percent of the maximum WUA requires 47 cfs, 95 percent of the maximum WUA requires 68 cfs and 100 percent of the maximum WUA requires 100 cfs. Thus, in the case of Rush Creek, it would require an additional 32 cfs in order to provide a 5 percent increase from 95 percent to 100 percent of WUA for the adult life stage. As discussed above, the increases in adult habitat as flows approach 100 cfs are attributable to increased habitat in the Mono Gate One return channel, not to increased habitat in the channel which supported the pre-diversion fishery.

In view of the issues discussed above concerning the DFG recommendation of 100 cfs for the months of May through September, the slow rate of increase in the WUA for adults versus the quantity of flow required, and the fact that the flow contribution from Parker Creek and Walker Creek was not accounted for in the DFG recommendation, the SWRCB concludes it would not be appropriate to require minimum flows at Mono Gate One corresponding to 100 percent of the WUA identified in the Beak study. (DFG 52.) Requiring wet year minimum instream flows at Mono Gate One which would provide 95 percent of the maximum WUA for adult brown trout in Rush Creek will provide sufficient flow for reestablishment and protection of the fishery.

Establishing a minimum instream flow requirement for releases from Mono Gate One to Rush Creek which corresponds to 95 percent of the WUA for adults results in a 68 cfs requirement from April 1 through September 30. Similarly, 95 percent of the WUA for spawning can be provided at 52 cfs. In order to protect spawning habitat, redds in the gravel and emerging fry, the 52 cfs requirement should remain in effect from October 1 through March 31 of wet hydrologic years. Los Angeles' water right licenses should be amended to require the release of these flows or the inflow to Grant Lake, whichever is less.

Table 13 below summarizes the instream flow requirements for Rush Creek established in this decision for dry, normal, and wet hydrologic year types.

TABLE 13: INSTREAM FLOW REQUIREMENTS FOR RUSH CREEK

DRY HYDROLOGIC CONDITIONS -RUSH CREEK	
APRIL 1 THROUGH SEPTEMBER 30	31 CFS[1]
OCTOBER 1 THROUGH MARCH 31	36 CFS[1]
NORMAL HYDROLOGIC CONDITIONS -RUSH CREEK	
APRIL 1 THROUGH SEPTEMBER 30	47 CFS[2]
OCTOBER 1 THROUGH MARCH 31	44 CFS[2]
WET HYDROLOGIC CONDITIONS -RUSH CREEK	
APRIL 1 THROUGH SEPTEMBER 30	68 CFS[2]
OCTOBER 1 THROUGH MARCH 31	52 CFS[2]

[1] These instream flows will be maintained, if necessary, with releases from storage until such time as Grant Lake reaches a volume of 11,500 AF. If storage falls below 11,500 AF, the instream flow requirement will change to the dry hydrologic year flow requirement or the inflow to Grant Lake, whichever is less.

[2] For normal and wet hydrologic conditions, flow requirements are the above instream flow requirements or the inflow to Grant Lake from Rush Creek, whichever is less. If the inflow to Grant Lake from Rush Creek drops below dry year instream requirements, then release from storage at Grant Lake to maintain dry instream flows as prescribed for dry year conditions is required until such time as Grant Lake reaches a volume of 11,500 AF.

5.4.3 *Channel Maintenance and Flushing Flows*

The DFG channel maintenance and flushing flow recommendations for Rush Creek were developed by Dr. G. Mathias Kondolf and presented as DFG Exhibit 168. Dr. Kondolf's initial recommendations were modified to conform with DFG's hydrologic classifications. The revised DFG recommendations for channel maintenance and flushing flows for Rush Creek are presented in Table 14 below, based on the numbers from DFG Exhibit 170A. These flows are within the capacity of the Mono Gate One return ditch as presented in Table 2 of SWRCB Exhibit 40.

TABLE 14: CHANNEL MAINTENANCE & FLUSHING FLOW REQUIREMENTS RUSH CREEK

HYDROLOGIC CONDITION	REQUIREMENT
DRY YEAR	NO REQUIREMENT
DRY-NORMAL YEAR	NO REQUIREMENT
NORMAL YEAR	200 CFS FOR 5 DAYS
WET-NORMAL YEAR	300 CFS FOR 2 DAYS RAMP DOWN TO 200 CFS.MAINTAIN 200 CFS FOR 10 DAYS
WET YEAR	300 CFS FOR 2 DAYS RAMP DOWN TO 200 CFS.MAINTAIN 200 CFS FOR 10 DAYS
RAMPING RATE - NOT TO EXCEED A 10% CHANGE IN STREAMFLOW PER 24 HOURS	

Runoff year definition:			
	Dry	80-100% exceedence	(68.5% of average runoff)
	Dry-Normal	60-80% exceedence	(between 68.5% and 82.5% of average runoff)
	Normal	40-60% exceedence	(between 82-5% and 107% of average runoff)
	Normal-Wet	20-40% exceedence	(between 107% and 136.5% of average runoff)
	Wet	0-20% exceedence	(greater than 136.5% of average runoff)

The ramping requirement applies to changes in flow made by LADWP. LADWP is not required to compensate for natural fluctuations in flow.

Dr. Kondolf indicated that the 20 percent to 80 percent of runoff used for DFG's "normal" hydrologic year definition was too broad for normal hydrologic conditions. (DFG 168, pp. 10-11.) Instead, Dr. Kondolf divided the water years into five classifications as shown above.

Mr. Trihey testified that, based upon composition and stability of streambed material above the Narrows and the opportunity to rewater relic channels below the Narrows, the channel maintenance flows of 165 cfs prescribed in the interim court order could be increased to as much as 250 cfs. (NAS&MLC 104, p. 4 and NAS&MLC 1X, p. 11.) He further indicated that, if flows required to maintain a higher Mono Lake level elevation are above the minimum needed to maintain the fishery, Rush Creek can accommodate higher flows without substantial harm to the fishery. The best time for the higher flows would be during the snowmelt runoff. Mr. Trihey testified that, at 350 cfs, Rush Creek would experience minimal erosion of streambed and streambanks. (NAS&MLC 1X, p. 12.)

Dr. Beschta's testimony acknowledged that ramping constraints should be developed to prevent exceptionally rapid changes in flows. (LADWP 9, Section 2, p. 23.) As part of LADWP's revised Mono Lake Management Plan, LADWP recognized the need for establishing channel maintenance and flushing flows for Lee Vining and Rush Creeks and recommended channel maintenance and flushing flows somewhat lower than the DFG recommendation. (LADWP 154, p. 3, Table 2.) The channel maintenance and flushing flow recommendations presented by DFG were supported by the detailed testimony of an expert witness with experience in stream channel morphology. (DFG 168, 170A; NAS&MLC 1X.) Consequently, the SWRCB concludes that the weight of the evidence supports adoption of the channel maintenance and flushing flow requirement for Lower Rush Creek below Grant Lake as recommended by DFG and identified above in Table 14.

5.4.4 *Additional Measures to Assist in the Restoration of the Pre-Project Fishery*

The long period of little or no flow in Rush Creek below LADWP's point of diversion at Grant Lake resulted in significant losses of riparian vegetation and other deterioration of channel conditions. Several witnesses presented testimony regarding pre-1941 conditions on Rush Creek, restoration measures which have already been undertaken under the direction of the Restoration Technical Committee established by the Superior Court, and recommendations for further restoration work to help restore good fish habitat conditions.

Mr. Trihey's written testimony indicates that low or erratic streamflows adversely affected pre-1941 fish habitats and populations above the Narrows. (NAS&MLC 1Y, p. 29.) The conditions that benefitted the fishery above the Narrows were a well-developed riparian corridor, a functioning floodplain and a stable stream channel. The conditions that benefitted the fishery below the Narrows were persistent streamflows, very stable stream temperatures, abundant supply of spawning gravel, deep low velocity water, a functioning floodplain and a well developed riparian zone. (NAS&MLC 1Y, p. 30.)

The focus of the restoration work which Mr. Trihey has undertaken on behalf of the Restoration Technical Committee was:

> "...to restore the conditions which benefitted pre-1941 fish populations such that the pre-1941 fishery can be re-established and maintained as required by Cal Trout II. But given the present day institutional considerations, the existing channel morphology and some basic relationships in physical science it is not possible to fully restore (or even significantly approach restoring) all of the conditions of the Rush Creek bottomlands which benefitted the pre-1941 fish populations." (NAS&MLC 1Y, p. 30.)

The Restoration Planning Team conducted research as to the conditions which benefitted the pre-project fish populations in Rush Creek. Of the numerous restoration measures which the planning team prepared for consideration by the Restoration Technical Committee, Mr. Trihey identified the specific treatments that he considered appropriate to implement and accelerate the recovery of a quality fish population in Rush Creek. (RT XXVIII 33:7-33:18; NAS&MLC 105, pp. 3-9, Mr. Trihey's recommendations are identified with asterisk.) Mr. Trihey's list of restoration recommendations includes: the rewatering of several historic auxiliary channels and meander bends; the development and deepening of pools and runs; developing spawning and rearing habitat in overflow channels; the placement and anchoring of woody debris; developing and enhancing backwater and wetland areas; modifying and enforcing angling regulations to provide for the recovery of the fishery. (NAS&MLC 105, pp. 3-11.)

Trihey and Associates prepared a feasibility study evaluating the potential for rewatering the historic Rush Creek below Grant Dam. Mr. Trihey's recommendation to the Restoration Technical Committee was that if the Restoration Committee finds it desirable to rewater the historic channel of Rush Creek immediately below Grant Dam, it would be most cost effective and least complicated to implement one of the three options proposed under design alternative "D" (breaching the return ditch wall). (NAS&MLC 135, p. 18.) Rewatering of the historic channel below

Grant Lake was not among the restoration measures recommended by Mr. Trihey. (NAS&MLC 105, p. 3; RT XXVIII, 33:5-33:11.)

LADWP presented testimony by Dr. Beschta who recommended a number of interim and long-term restoration measures for Rush Creek. The four interim measures are: continued watering of the channel; elimination of grazing in the riparian corridor; placement of woody debris in channels after three to five years; and elimination of the current program of structurally modifying channels and adding gravel. (LADWP 9, Section 2 p. 23.) Long-term restoration measures recommended by Dr. Beschta include: flows that mimic the natural flow regime; flows equal to or exceeding minimum instream flow requirements for fisheries that always be allowed to bypass diversions; ramping constraints that are developed to prevent exceptionally rapid changes in flow; the occurrence of peak flows of varying timing and magnitude that are captured in flow regimes; and, within five to ten years, the seasonal rewatering of side channels allowed to occur without human intervention. (LADWP 9, Section 2 p. 23.)

In LADWP Exhibit 137, Dr. Beschta expanded his discussion of the restoration needs for Rush Creek. (LADWP 137, pp. 8-15.) He continued to emphasize that the most significant restoration measure is the return of continuous flows to Rush Creek. He recommended that the grazing moratorium should continue until at least the year 2000, after which the condition of the vegetation along the stream and bottomlands should be reevaluated. At that time, it may be possible to reintroduce grazing as long as the grazing does not interfere with the establishment, growth and succession of riparian dependent vegetation. Dr. Beschta reemphasized his opposition to structural modifications to Rush Creek or its bottomlands and recommended that building structures within or along the stream channel via cabling, rebar, the placement of large rocks, or any other means of anchoring should be prohibited. Dr. Beschta also recommended elimination of the culvert and road crossing at the Ford in the Rush Creek bottomlands. Road access onto the bottomlands should be limited in order to prevent vehicular traffic from damaging Rush Creek.

Finally, Dr. Beschta advised that it is not necessary to develop pool habitat for fish because the natural process will in time develop pools which he believes will be more stable than artifically constructed pools. (LADWP 137, pp. 8-15.)

DFG is a member of the Restoration Technical Committee which directed the development of several restoration plans by Trihey and Associates. However, DFG did not make specific recommendations regarding restoration treatments of the stream channel or riparian corridor for Rush Creek. Mr. Smith testified that DFG recommends the rewatering of the historic Rush Creek channel below Grant Lake, but did not identify which of the rewatering options developed by Trihey and Associates was preferred by DFG.

The evidence discussed above supports the conclusion that, in addition to the flow requirements, the following other measures should be undertaken to restore and maintain in good condition the fishery as it existed in Rush Creek prior to the diversion of water by LADWP.

1. Minimum flows released to maintain the fishery should remain in the stream channel and should not be diverted for any use other than maintenance of the Rush Creek fishery.

2. Livestock grazing should be prohibited within the Rush Creek riparian corridor for a minimum of ten years from the date of this order. Any resumption of grazing in the future should be subject to approval by the Chief of the Divsion of Water Rights of a plan prepared by LADWP in consultation with DFG.

3. LADWP should develop a program to place woody debris in the stream channel to provide fish habitat in accordance with a plan developed in consultation with the DFG.

4. LADWP should prepare a plan for rewatering side channels and meander bends in accordance with the procedure specified in

the order at the end of this decision. The plan should consider the following:

a. Reactivating A-Ditch to transport excess water away from Rush Creek during periods of high flow.

b. Providing small seasonal surface flows in relic channels and adjacent wetlands in the upper portion of the segment described as study reach 2 in DFG Exhibit 52.

c. Rewatering two meander bends below Highway 395 described in the middle of study reach 3 (DFG 52) and also described by Trihey and Associates. (NAS&MLC 125.)

d. Reactivating historic channels in the segment from the Narrows to the meadows crossing to accommodate high seasonal flows.

5. Road access in Rush Creek bottomlands should be restricted. Vehicular traffic should be restricted from entering or crossing Rush Creek or the Rush Creek riparian corridor except at designated locations.

6. Vegetation disturbed by construction for any of the restoration activities required by this order should be restored and revegetation should commence as soon as construction activities have been completed.

7. LADWP should consult with DFG to determine if additional revegetation is necessary to maintain the fish in good condition in Rush Creek.

8. LADWP should install and maintain a continuous recording device satisfactory to the Chief of the Division of Water Rights to measure the flow of Rush Creek into Grant Lake and the flow to the return ditch at Mono Gate One.

The installation of a continuous flow recording device and the prohibition of grazing in the riparian corridor can be implemented without the need for a lengthy planning period. The other measures specified above should be addressed in the stream restoration plan required to be prepared under the provisions of this decision.

5.5 Summary of Measures for Restoration and Protection of Fisheries

The evidence establishes that restoration of continuous flows to the four diverted streams is by far the most important single step to restore and maintain the fishery that existed prior to LADWP's diversions. Appropriate flow requirements for each stream are specified in the preceding sections. Providing channel maintenance and flushing flows for each stream will help maintain stream conditions that benefit the fishery and will promote the recovery of adjacent riparian areas. The ramping rates specified above will help to ensure that fish are not injured by changes in flow. If future information establishes that the flows specified for fishery protection should be revised, the SWRCB's continuing authority provides a means of making appropriate revisions. The order at the end of this decision includes a term setting forth the SWRCB's continuing authority over LADWP's licenses.

The evidence also establishes the need for a number of other measures to help restore and protect fish habitat in the four streams such as removal of livestock grazing, restriction of vehicular access, reopening historic side-channels and other measures specified in the findings regarding each specific stream. These measures should be addressed in the stream restoration plan which LADWP is required to develop and submit in accordance with the amended terms of its water right licenses as specified at the end of this decision.[8]

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[8] *The prohibition on grazing within designated riparian areas is effective upon entry of this decision. The stream restoration plan to be developed in accordance with the schedule specified in the order at the end of the decision should provide documentation of the livestock grazing exclusion in specific areas.*

Finally, evidence was presented regarding the desirability of changing fishing regulations during the period the fishery in the four streams is recovering. Fishing regulations are subject to the jurisdiction of the Fish and Game Commission rather than the SWRCB. The evidentiary record in the water right hearing, however, would strongly support imposition of a temporary moratorium on fishing in the stream reaches downstream of the LADWP diversions to assist in recovery of the fishery.

6.0 PROTECTION OF OTHER PUBLIC TRUST RESOURCES AND BENEFICIAL USES OF WATER WITHIN THE MONO BASIN

In addition to the fishery resources discussed above, there are a number of other public trust resources and beneficial uses of water affected by water management decisions in the Mono Basin. These include birds and other wildlife in the Mono Basin, the organisms in Mono Lake which provide food for birds, riparian vegetation, air quality, visual and recreational resources, and water quality. Sections 6.1 through 6.9 below address the protection of these resources.

6.1 Mono Lake Aquatic Productivity

The Mono Lake alkali fly (*Ephydra hians*) and the Mono Lake brine shrimp (*Artemia monica*) are the major food sources of the large bird populations at Mono Lake. The survival and reproduction of both species can be affected by changes in salinity of the water in Mono Lake. The salinity in Mono Lake is an inverse function of the quantity of water in the lake; as the water elevation rises, salinity decreases, and as the water elevation falls, salinity increases. The majority of the evidence presented regarding Mono Lake aquatic productivity was incorporated into the Draft EIR for the Review of the Mono Basin Water Rights of the City of Los Angeles and the supporting auxiliary reports. (SWRCB 7, 13h, 13l, 13m, 13n, 13o, 13p, and 13t.) LADWP presented several additional reports and the direct testimony of Dr. John Melack and Dr. William Kimmerer. (LADWP 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 41, 99, 100, 101, and 102.) DFG presented the direct testimony of Darrell Wong (DFG 1), and NAS&MLC submitted the direct testimony of Dr. David Herbst and supporting exhibits. (NAS&MLC 1G, 52, 64, 65, 66, 66A, 66B, 201, 201A, 202, 203, 218, 219, 238.)

Dr. Melack testified that he considers that Mono Lake is "healthy" and was healthy during the period in which he conducted his investigations of the aquatic productivity from 1979 to 1992. (LADWP 22, Section 1, p. 22.) Lake levels during this period ranged from a mean sea level (MSL) elevation of 6,372 feet to 6,381 feet. Dr. Melack stated that he could only testify to aquatic productivity conditions that existed during his investigations and that it would be inappropriate for him to speculate about possible effects on aquatic productivity of conditions that may exist at lake levels not observed during his studies. Dr. Melack acknowledged that increased salinity levels decreased the reproductive capability of brine shrimp under laboratory conditions. (RT X, 48:3-48:8.)

The evidence of the effect of increased salinity on brine shrimp is graphically displayed in Figure 2 of Auxiliary Report No. 12. (SWRCB 13 L, Figure 2.) The graphic presentations in Figure 2 of that report indicate that as salinity decreases to 50 grams per liter (g/l), the various life stages of brine shrimp improve. Auxiliary Report No. 12 concludes that "Predation and competition are likely to be significant factors in influencing shrimp productivity at lower salinities, while individual physiological constraints and *Atremia* interactions with nutrients and algae attain prominence at higher salinities." (SWRCB 13 L, p. 23.)

During five years (1983-1987) of Dr. Melack's study period, meromixis occurred. This condition is considered a rare event, which is described as a persistent salinity stratification which occurs when large freshwater inputs into a saline lake cause a lens of relatively dilute water to rest on top of a heavier layer of more saline water. (RT X, 41:17-41:20.) The onset of meromixis prevented the annual winter period of vertical mixing with consequent reductions of ambient ammonium levels in the mixed layer. This led to marked reductions in algal biomass and annual photosynthetic activity. (LADWP 22, Section 1, p. 15).

Conclusions drawn from the study of the interaction of brine shrimp with ammonium and algal biomass indicate that low food levels available during meromixis in the spring depress the survival of brine shrimp. (LADWP 22, Section 1, p. 15.)

Laboratory experiments and direct observations by Dr. Melack and his team of investigators indicate that the importance of nitrogen cycling to photosynthesis and the compensatory interaction between algae and brine shrimp is significant within moderate salinity ranges. The limiting factor to brine shrimp populations may be more related to availability of food supply than to salinity concentrations. Dr. Melack suggests that additional investigations are needed to develop a more precise understanding of the interactions between nitrogen, algal and the brine shrimp components of the pelagic ecosystem. (LADWP 22, Section 1, p. 15.)

A significant portion of the period during which Dr. Melack conducted his investigation occurred during the meromixis condition. Consequently, his conclusions represent the effects of meromixis to a large degree and, to a lesser degree, they represent the changes to the ecosystem which occur during the more common "monomixis" condition which exists when the water is more evenly mixed. Dr. Melack's team conducted an extensive monitoring program from 1982 to 1992 during which lake level and salinity changed. Despite this extended data record, Dr. Melack concluded that direct observation of effects of salinity on the *Artemia* population is difficult and unlikely to be detected even if present. It is likely that effects of salinity changes experienced during the 1982-1992 study period were obscured by effects due to meromixis. (SWRCB 13m.)

The University of California at Santa Barbara research team headed by Dr. Melack developed simulation models for forecasting conditions in Mono Lake at lake levels which are outside of those observed by his team. Two models were produced, a vertical mixing model and a plankton model. The vertical mixing model was designed to predict the likelihood of meromixis under various inflow regimes. The plankton model was designed to assess possible responses of the brine shrimp to different lake levels. The supporting documentation provided by the U.C. Santa Barbara team, indicated that both of these models are quite limited. Dr. Melack's written testimony indicates that the use of the vertical mixing model in the Draft EIR is inaccurate due to the possibility of missing mixing mechanisms and data insufficiencies. (LADWP 22, section 1, p. 21.) Dr. Melack also stated that the predictive value of the plankton model for conditions in Mono Lake possibly occurring at lake levels not observed is uncertain. (LADWP 22, Section 1, p. 22.) Dr. Melack acknowledged that a rise in the lake level from 6,377 to 6,390 feet in a monomictic condition would be a positive change. (RT X, 119:17-119:21.)

Dr. Herbst conducted experiments on brine shrimp growth at various salinities representing prediversion conditions (50 g/l), present conditions (100 g/l), and at the salinity which would be present at a lake level of approximately 6,390 feet (75 g/l). The results of this experiment indicate that brine shrimp hatched at all three salinities tested. However, fewer shrimp matured to the adult stage with each increase of salinity. Also, the shrimp that matured to adult stage were smaller in body size with each increase of salinity. (NAS&MLC 1g, p. 9; NAS&MLC 201, 202, and 203.)

Dr. Herbst also presented the results of his recent experiment titled "Salinity Limits Nitrogen Fixation in Sediments from Mono Lake, California." (NAS&MLC 65.) The conclusion of this experiment indicated that the increase in salinity over the past 50 years, from 50 g/l at pre-diversion conditions to near 100 g/l at present has been associated with a concurrent decline in nitrogen fixation. (NAS&MLC 65, p. 8.) Nitrogen availability is limiting with regard to the phytoplankton algal food resource of brine shrimp. The growth of benthic algae, an alkali fly food source, is also nitrogen limited. (NAS&MLC 1g, p. 11.)

NAS&MLC presented testimony by Dr. Herbst which indicated that the Mono Lake ecosystem has been significantly and measurably degraded as a result of the dropping of the lake level from pre-diversion levels to current levels. Dr. Herbst takes issue with the statement in the Draft EIR that the cumulative impacts of LADWP's diversions have had an unknown effect on alkali flies. Dr. Herbst believes that any lake level alternative below 6,390 feet has a significant adverse effects on the alkali fly. (NAS&MLC 1G, p. 2.) Dr. Herbst regards a lake level of 6,390 feet as the lower limit of the range of levels for which the aquatic productivity of Mono Lake is relatively high.

Dr. Herbst based his recommendations on several scientific investigations he conducted himself or as part of a team of investigators from 1982 through the latest study completed in 1993. (RT XXIII, 245:20; NAS&MLC 65.) Auxiliary Report No. 8 prepared by Dr. Herbst describes experiments designed to produce field data to assist with the evaluation of the effects of salinity on alkali flies. (SWRCB 13h.) The experiments "showed that productivity is significantly retarded at higher salinities (i.e., lower lake levels). Productivity at the current salinity of approximately 100 grams per liter ("g/l") is less than half that at the pre-diversion salinity of approximately 50 g/l." (NAS&MLC 1G, p. 6.)

Dr. Kimmerer, representing LADWP, testified that he and Dr. Herbst prepared the alkali fly productivity model for use in preparing the Draft EIR. His function was that of an expert modeler, rather than an expert on Mono Lake or alkali flies. (RT X, 63:10-64:2.) Due to the modifications made by the EIR consultant, Dr. Kimmerer considers the alkali fly model used in preparing the Draft EIR to be of no value. (LADWP 41, Section 3, p. 54.)

Dr. Herbst testified that the primary difference between the model which he and Dr. Kimmerer prepared and the modified model used in the Draft EIR is that the modified model relies on assumptions about birth and death rates which are arbitrary. The model developed by Dr. Herbst and Dr. Kimmerer was based upon empirical data obtained from field and laboratory studies. (NAS&MLC 1g, p. 7.) Although the two versions of the model produce similar results, Dr. Herbst indicated that the original version is more reliable. Both models indicate that increasing salinity has a pronounced effect upon alkali flies. (NAS&MLC 1g, p. 7.)

In summary, LADWP presented expert testimony that the Mono Lake ecosystem at lake levels of 6,372 to 6,381 feet is in a "healthy" condition. The testimony of LADWP's experts also indicates that increased salinity has caused decreased productivity of brine shrimp under laboratory conditions. Expert testimony presented by NAS&MLC indicates that increased salinity and other effects of lower lake levels had adverse effects upon both the alkali flies and the brine shrimp.

Based on the evidence presented, the SWRCB concludes that a water level in Mono Lake at or near 6,390 feet will maintain the aquatic productivity of the lake in good condition. Lake levels below 6,390 feet will have some negative effects to Mono Lake aquatic productivity although the extent of the adverse effect is difficult to quantify.

6.2 Hydrology, Riparian Vegetation and Meadow/Wetland Habitat

An extensive body of information has been compiled describing the pre-1941 and post-1941 hydrologic and vegetative conditions in the Mono Basin. Much of the information was presented in the Draft EIR and auxuliary reports, and additional information was presented at the evidentiary hearing. (e.g., SWRCB 3, 4, 7, 10 and 13a: NAS&MLC 116, 122, 125, 127, 137 and 175; and CT 5D, 5K, 5O, 5R and 15; and LADWP 7.)

6.2.1 *Pre-1941 Hydrologic Conditions*

Mono Basin streams have a long history of water diversions dating back to the 1860s. Water was diverted from Mono Basin streams for irrigation, milling, mining, hydroelectric power generation, stockwatering and domestic use. Irrigation water was diverted and moved from many of the basin's streams by a system of ditches and canals. Most diversions were during the irrigation season, although some continued throughout the year. (SWRCB 7, Vol. 1, 3C27-28.)

Diversion of Walker and Parker Creeks for irrigation began in the 1860s on the present day Cain Ranch and, by 1930, most of the flow was diverted for irrigation. (SWRCB 7, p. 3C-4.) The annual average runoff from Walker Creek is estimated at 5,400 acre-feet. The annual average runoff of Parker Creek is estimated at 9,100 acre-feet. (SWRCB 7, Vol. 1, p. 3A6-7). In the years immediately preceding LADWP's export of water from the Mono Basin, irrigation diversions from Walker Creek were approximately 4,000 acre-feet per year and irrigation diversions from Parker Creek were approximately 5,900 acre-feet per year. (LADWP 6, p. 130.)

Prior to 1915, no water storage existed on either Rush or Lee Vining Creeks. Dams were constructed at Gem Lake and Agnew Lake as part of a Rush Creek power project which began operation in 1916. (LADWP 7, Appendix I, p. VII.) A power project on Lee Vining Creek began operation on October 5, 1924. (LADWP 7, Appendix I, p. IX.) In 1915, a 10 foot high dam was constructed on Rush Creek to enlarge the capacity of Grant Lake. The height of the dam was increased to 20 feet in 1925 to provide additional storage for irrigation. (NAS&MLC 125, p. 3.)

During the 1920s and 1930s, the historical period of maximum irrigation, an average of 50 percent of the annual flow of Rush Creek was diverted into three major irrigation ditches between Grant Lake Dam and the old Highway 395 bridge. The A-Ditch and B-Ditch diversions caused local dewatering of Rush Creek between B-Ditch and the Parker Creek confluence. These diversions were used to apply large quantities of water (up to 45 acre-feet/acre) on the highly permeable substrates of Pumice Valley. (SWRCB 13a pp. 21-22.) Indian Ditch diverged approximately 2,000 feet downstream of the Rush Creek narrows and flowed parallel to the western side of Rush Creek to an area colloquially called the "lower meadowlands." Irrigation from Indian Ditch ceased shortly after 1940.

Lee Vining Creek water was diverted by six main irrigation canals and several minor diversions. O-Ditch which conveys irrigation water to streamside meadows above the USFS Ranger District compound is still in use. Lee Vining Ditch (aka Curry Ditch) diverged immediately above U.S. Highway 395 and was used until 1959 as a water supply for the town of Lee Vining and for irrigation of nearby land. The Ney and Jamison ditches diverted water from Lee Vining Creek below U.S. 395 to irrigate pastures on the west and east sides of the creek near the county road. Other ditches also diverted water for in-basin irrigation, but most were abandoned by the early 1950s. (SWRCB 13a, pp. 23-24 and SWRCB 7, Vol. 1, p. 3C-5.)

Pre-1941 agricultural and power diversions influenced local hydrologic and biotic conditions particularly on Rush Creek. During the early decades of this century, large quantities of water were diverted from Lee Vining, Walker, Parker, and Rush Creeks and applied to surrounding land. Combined diversions ranged from 46,000 acre-feet per year to 81,000 acre-feet per year with an average of 60,000 acre-feet per year for the period 1925 to 1929. (LADWP 6, p. 133.) Much of that water (less evapotranspiration) probably returned to the basin in shallow ground water tables that sometimes formed springs along the creeks or entered Mono Lake as unmeasured ground water inflow.

The history of diversions is an important factor in understanding the pre-1941 riparian communities because: (1) diversion of water dewatered some stream sections, at times leaving no surface flow; (2) irrigation diversions appear to have contributed substantially to springflow along the Rush Creek bottomlands and elsewhere, significantly augmenting the base flow of the stream while also supporting wetland and riparian communities (SWRCB 13a, p. 20; NAS&MLC 116, p. 13; and NAS&MLC 122, p. 5); and (3) upstream regulation by hydroelectric power projects increased the streamflows during the late summer and fall irrigation season. (LADWP 7, p. 5.)

In addition, grazing probably had an important impact on riparian vegetation. Twelve hundred to eighteen hundred head of cattle grazed the Cain Irrigation Company lands annually in the late 1920s from April to October. (LADWP 7, p. 9.) Dr. Platts testified that heavy grazing occurred along Rush Creek up to 1941. (LADWP 1, p. 2.) Grazing in the Mono Basin in general was heavy in 1940. On April 1, 1940, for example, 9,100 cattle, 825 horses and 25,000 sheep were grazed in the Mono Basin. (LADWP 1, p. 3.) Dr. Beschta testified that by 1940 extensive grazing had probably caused significant changes to plants along the streams in the Mono Basin, but the overstory canopies remained largely intact. Channel banks were impacted by grazing, but widespread channel changes had not yet occurred. (LADWP 9, p. 21.) Photographs by Eldon Vestal show indicators of localized bank and vegetative impacts probably due to livestock grazing. (CT 5M and 5O.) The high flow event of 1938 did not significantly alter stream channels, however, because riparian vegetation was sufficiently intact to resist erosive forces. (LADWP 9, p. 22.) Thus, the record shows that, prior to 1941, the long-term impact of grazing was localized and the riparian community was still intact and helped protect stream channels from erosion.

6.2.2 *Post-1941 Hydrologic Conditions*

LADWP constructed the present-day Grant Lake Dam in 1939 and 1940, thereby enlarging the existing Grant Lake to provide a maximum storage capacity of about 48,000 acre-feet. LADWP constructed diversion facilities on Lee Vining Creek, Walker Creek, and Parker Creeks so that flows could be diverted to Grant Lake through the Lee Vining Creek Conduit. The Lee Vining Creek Conduit has a capacity of approximately 300 cfs at Lee Vining Creek, 325 cfs at Walker Creek and 350 cfs at Parker Creek.

(NAS&MLC 125, p. 3; SWRCB 7, pp. 3A-14 and 15.) The 11 mile long Mono Craters Tunnel was constructed to convey water from the Mono Basin into the upper Owens River. In 1940, LADWP constructed Long Valley Dam to hold the Mono Basin exports in Crowley Reservoir. (SWRCB 7, Vol. 1, 3A-16.)

LADWP began diversions from the Mono Basin in April of 1941. Between April 1941 and March 1970, annual out-of-basin diversions averaged approximately 57,000 acre-feet per year. (NAS&MLC 125, p. 3.) In 1970, the LADWP Aqueduct facilities were enlarged with construction of the "second barrel" between Haiwee Reservoir and Los Angeles. The original aqueduct had a capacity of 500 cfs and an annual export capacity from all sources in the Owens Basin and the Mono Basin of about 360,000 acre-feet per year. With the addition of the second barrel, the aqueduct gained an additional 300 cfs capacity, increasing annual exports from the Owens and Mono Basins to about 585,000 acre-feet per year. (SWRCB 7, Vol. 1, p. 3A-17.) Annual Mono Basin exports increased to an average of 102,000 acre-feet per year through 1981 which represents 82 percent of the long-term average runoff from Rush Creek and Lee Vining Creek. (NAS&MLC 125-p. 3.) Between the late 1940s and mid-1980s, water exports resulted in the dewatering of the lower reaches of the four Mono Basin streams diverted by LADWP.

6.2.3 *Riparian Vegetation and Meadow/Wetland Habitats*

Riparian areas provide many ecological benefits including habitat for a diversity of wildlife, flood flow attenuation and bank stabilization, invertebrate food production for fish and wildlife, nutrients for aquatic systems, and recreational opportunities such as hiking, fishing, wildlife observation, camping and photography. (SWRCB 7, Vol. 2. p. 3C-7; SWRCB 7 Vol. 2; p. 3J-11.)

Riparian vegetation in the Mono Basin consists of trees and shrubs that occur on tributary floodplains, banks, springs or seeps. Meadow/wetland habitats are grasslands with waterlogged soils near the surface but without standing water for most of the year. (CT 15, p. 6-1.) Historically, riparian conifer forests dominated streamsides in the higher elevations and gave way to conifer-broadleaf forest and cottonwood-willow woodlands at successively lower elevations creating a generally continuous corridor from the montane forests of higher elevations to near the lakeshore of Mono Lake. (SWRCB 7, Vol. 1, p. 3F-10.) High ground water, irrigation, springs and the seasonal overbank flow provided the necessary water to support meadow/wetland habitats.

Prior to LADWP diversions, Lee Vining Creek had approximately 32 acres of seasonally wet meadow. This meadow was located west of Lee Vining Creek near the stream mouth above and below the county road and was irrigated by an unnamed ditch. Maintenance of the meadow was believed to be dependent on irrigation. It has since reverted to sagebrush. (SWRCB 13a, p. 59.)

Historically, wetland/meadow habitat on Rush Creek occurred on the floodplain, at hillside seeps or springs and in irrigated areas. Rush Creek had approximately 131 to 133 acres of meadow or wetland habitat along the creek. This does not include approximately 130 acres of lake fringing wetlands located on the Rush Creek delta. (SWRCB 7, Vol. 1, Table 3C-14; CT 15, pp. 6-12 and 6-13; and CT 5M, photograph of Rush Creek delta.) Most of the streamside habitat was located in the bottomlands.

6.2.4 *Effects of LADWP Water Exports on Riparian Vegetation*
Between 1941 and the 1960s, much of the riparian area along lower Rush, Parker, Walker and Lee Vining Creeks was desiccated due to the lack of flow in the diverted stream reaches. A fire in lower Lee Vining Canyon in the early 1950s destroyed much of that desiccated riparian community. Additionally, the reduction or cessation of irrigation from the "A" and "B" ditches impacted the Rush Creek bottomland springs, meadows and associated riparian community.

The diversion of water from the Mono Basin caused the water level in Mono Lake to drop 45 vertical feet to 6,372 feet at the historic low water level. The water level was approximately

6,375 feet in the winter of 1994. Due to the lowering of the lake and the deterioration of riparian vegetation, flood events in the late 1960s and early 1980s resulted in major incision of tributary deltas and streams. Incision into former floodplains drained shallow ground water tables and left former side channels stranded above the newly incised main stream channels. The high flows caused extensive erosion resulting in a shifting, widening and straightening of the primary stream channels due in part to the lack of stabilizing riparian vegetation. (SWRCB 13a, pp. 50-53 and pp. 61-64; CT 15, p. 2-1; and NAS&MLC 125 p. 3.) Reduced flows and widening of the channels eliminated overbank flooding which, in turn, reduced the vigor of riparian vegetation and wetlands. The loss of the riparian community had serious impacts on the fishery of Rush and Lee Vining Creeks. (CT 15, p. 5-3.)

The Draft EIR compares the pre-diversion riparian vegetation acreage on the four diverted tributary streams with the 1989 point of reference conditions. (SWRCB 7, Vol. 1, Chapter 3C, Table 3C-2.) A reach-by-reach description of the vegetation is found in Appendix P of the Draft EIR. (SWRCB 7, Appendix P, p. 11-21.) Based on the data in the Draft EIR, a total of 204.4 acres of mature woody riparian vegetation had been lost on the four streams by 1989. Losses of over 100 acres of meadow and wetland acreage had also occurred. The largest losses of riparian vegetation and meadows were in the Rush Creek bottomlands and lower Lee Vining Creek below U.S. Highway 395. Most of the riparian vegetation losses were directly due to the export of water from the Mono Basin.

During the period from 1941 to the 1980s, LADWP leased out grazing rights to its land in the area of all four diverted streams. There has been a significant decrease in the acreage of meadow habitat on Rush Creek compared to pre-1941 conditions. In 1989, approximately 40 acres of the streamside meadow or wetland habitat remained of the previous approximately 130 acres. (SWRCB 7, Vol. 1, Chapter 3C, Table 3C-14.) This loss of meadow and wetland area is believed to be due to the reduction or elimination of irrigation diversions, diversion of water from

Parker and Walker Creeks, the incision of Rush Creek and the lack of overbank flooding. (CT 15, pp. 6-13 to 6-15.) Continued grazing on the desiccated meadows has probably contributed to deterioration of the meadow and wetland habitats. (SWRCB 7, Vol. 1 p. 3C-81.)

6.2.5 *Stream Restoration Work and Riparian Vegetation*

As discussed in Sections 5.0 through 5.5, considerable stream restoration work has already been done at the direction of El Dorado County Superior Court, but there are additional measures that should be taken to help restore the fisheries in the four diverted streams.

LADWP presented two videotapes to document the natural recovery of riparian vegetation on Lee Vining Creek and Rush Creek between the "Narrows" and the "Ford." (LADWP 11 and 139.) The videotapes document prolific growth of vegetation in the stream reaches depicted, but testimony from Mr. Messick, who participated on the Restoration Technical Committee planning team, indicates that vegetation recovery has been highly variable and not continuous along the streams. The recovery is primarily along the edges of the existing main channels and those side channels which now carry water. Mr. Messick testified that there is little natural recovery on the floodplain area between the stream channels. Mr. Messick also testified that there is very little natural recovery in some sites just a few feet away from the stream. (RT XL, 16:3-16:18.)

Dr. Stine testified that much of the vegetation, depicted in LADWP Exhibit 139 as recently established, actually had been there longer than ten years. (RT XL, 90:1-90:17.) Some scenes from the videotape looking upstream on Lee Vining Creek from the county road depict a cobble floodplain with sparse riparian vegetation recovery. (LADWP 11.) Mr. Messick testified that cobble sites such as depicted in the videotape will take more than 20 to 40 years for natural recovery and that these sites are extensive on Lee Vining Creek. (RT XL, 55:14-15:22.) There are also similar sites on Rush Creek. Mr. Messick identified several reasons for the lack of uniform recovery:

(a) overbank flows that favor establishment of riparian species had not occurred in these areas since the streams were rewatered;
(b) the channels have been incised resulting in a lower water table which reduces the chances of establishing seedlings; and
(c) loss of topsoil, leaving the remaining surface which is composed of large gravel and cobbles and which is relatively hot and dry. (RT XL, 16:19-16:25 and 17:1-17:14.)

Mr. Messick believes that sites with shallow water tables are the sites to be considered for active restoration as opposed to those areas already experiencing rapid natural recovery. (RT XL, 56:1-56:21.) Mr. Messick believes that active intervention by planting riparian vegetation is feasible and would be very beneficial for Rush, Lee Vining, Walker and Parker Creeks. (RT XL, 43:13-43:24 and 45:1-45:19.)

Dr. Stine testified that Rush Creek will not reoccupy the abandoned channels without active intervention. He believes that by removing the cobble plugs in the now existing multiple abandoned channels and rewatering those channels, Rush Creek could very rapidly return to the multi-channeled system that existed previously. (RT XL, 102:1-102:21.) At the time of the hearing, the Restoration Technical Committee Planning Team was preparing a report on the feasibility of rewatering channels on Rush Creek. (RT XL, 121:8-122:3.) Dr. Stine believes that reoccupying former channels on Lee Vining Creek would be easier than on Rush Creek because of a somewhat different geomorphology. (RT XL, 103:13-103:22.) Dr. Stine also supports planting riparian vegetation to accelerate recovery on sites along Rush and Lee Vining Creeks. (RT XL, 104:1-105:12.)

6.2.6 *Conclusions Regarding Riparian Vegetation*

Based on the evidence discussed in Sections 5.1 through 6.2.5 above, we conclude that riparian and meadow areas in the Mono Basin were affected by pre-1941 land and water management practices in various ways. Grazing practices had adverse effects on riparian vegetation in some areas, but long-term impacts from grazing were localized and the riparian community remained intact and much more extensive than today. On the positive side, water diversions for irrigation in the pre-1941 period contributed to springflows in the Rush Creek bottomlands and provided water for vegetation in riparian and meadow areas.

There is widespread recognition that the changes in water management practices since 1941 due to Mono Basin water exports have had major adverse impacts on riparian areas. Some of those effects are irreversible; some could be mitigated by a return to the irrigation and water management practices that prevailed before 1941; some will be mitigated by the return of continuous flows and channel maintenance flows as discussed in preceding sections; and others could be mitigated by various other restoration measures.

No party to this proceeding has urged a general resumption of the water management practices which prevailed in the years preceding 1941, practices which at times resulted in diverting the entire streamflow for irrigation. Rather than resuming large-scale irrigation within the Mono Basin, most parties to this proceeding recommend providing continuous instream flows for fishery protection and requiring most of the available water to flow to Mono Lake in order to raise the lake level. Thus, it is not realistic to expect full restoration of pre-1941 meadow and riparian areas, some of which were dependent upon water diversion for irrigation.

As discussed in preceding sections of this decision, however, there are a number of reasonable measures which can be taken to help promote the recovery of Rush Creek, Lee Vining Creek, Parker Creek and Walker Creek. Measures such as maintenance of continuous instream flows, providing periodic channel maintenance flows, continued exclusion of grazing, reopening side channels, and restricting vehicular access to stream channels and flood plains will not only directly benefit recovery of fisheries, but will also promote recovery of riparian vegetation. As discussed in Section 5.5, this decision requires that LADWP prepare and submit a plan to address specified stream restoration measures. The SWRCB recognizes that considerable work already has been undertaken by the Restoration Technical Committee under the direction of the El Dorado County Superior Court. In addition to the measures specifically identified in Section 5.5 above and completion of work done at the direction of the Superior Court, the SWRCB believes that the stream restoration plan which LADWP submits to comply with this order must consider other potential measures identified in the Draft EIR to help restore riparian areas along the four streams.

6.3 Wildlife and Wildlife Habitat

The Draft EIR reports that historical observers recalled the Rush Creek bottomlands once supported abundant waterfowl, deer, mountain lions, bobcats, and coyotes. (SWRCB 7, Vol. 2, p. 3F-11.) Nearly 300 bird species have been identified at Mono Lake including 98 species of water birds. (SWRCB 7, Vol. 2, p. 3I-9.) Dr. Joseph Jehl Jr. testified that prior to diversions by LADWP, there were no Caspian Terns in the Mono Basin and the population of gulls was small. Dr. Jehl testified that phalaropes and grebes were present, but the population numbers are not known. Dr. Jehl believes that snowy plovers were present but knows of no confirming evidence. (RT XII, 125:20-126:9.) The numbers of ducks and geese in the Mono Basin were much greater than today. (See Section 6.3.7 below.)

In 1991, Jones and Stokes Associates conducted surveys to characterize the wildlife species inhabiting streamside, lakeshore, upland and island habitats in the Mono Basin and floodplain habitats on the upper Owens River. (SWRCB 7, Appendix D.) A complete list of the species observed during the survey is found in Table D-4 of Appendix D of the Draft EIR.

More detailed information concerning Mono Basin wildlife is provided in four Auxiliary Reports prepared for the Draft EIR.[9]

The sections which follow discuss wildlife habitat conditions prior to 1941, wildlife habitat conditions following many years of Mono Basin water exports, and several species of particular interest which were addressed at the hearing.

6.3.1 *Pre-1941 Land-Use and Wildlife Habitat Conditions*

As discussed in Section 6.2.1, large quantities of water were diverted from Mono Basin streams for in-basin irrigation prior to 1941. A report from 1880 indicated that more than 2,000 acres of sagebrush near Mono Lake had been converted to tillable farmland at that time. Farms were concentrated along Mill, Lee Vining, Walker, Parker and Rush Creeks. Pasture areas were created by expanding and irrigating natural meadows. (SWRCB 7, Vol. 2, p. 3G2-3.) In addition to agricultural land use, vacation homes and resorts were developed along the streams and near lakes at higher elevations.

Despite the agricultural development and other land-use changes that had occurred prior to 1941, the Mono Basin still sustained important wildlife habitats and wildlife populations. In preparing the Draft EIR, the consultant reviewed published literature and field notes of expert naturalists and interviewed long-time Mono Basin residents about their recollections of wildlife resources prior to 1940. Although few quantitative data are available that describe the prediversion wildlife resources

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[9] *Morrison, M. 1991. Vertebrate Surveys on Paoha Island and Adjacent Mainland, Mono Lake and Basin, California. Auxiliary Report #2 (SWRCB 13b);*

Harris, J. H. 1991. Wildlife Surveys in Riparian and Wetland Habitats in the Mono Lake Basin and Upper Owens Valley, California. Auxiliary Report #3 (SWRCB 13c);

Shivik, J. A., and R. L. Crabtree. 1992. Population Characteristics and Food Habits of Coyotes of the Northwest Shore of Mono Lake, with Emphasis on Visitation to California Gull Breeding Colonies. Auxiliary Report #6 (SWRCB 13f); and

Rubega, M. 1992. Feeding Limitations and Ecology of Red-necked Phalaropes at Mono Lake, with Incidental Observations on Other Species. Auxiliary Report #11 (SWRCB 13k.)

of the Mono Basin (SWRCB 7, Vol. 2, p. 3F-2.), it is undisputed that Mono Lake represents a major stopover point for migratory water birds in western North America. The lake also is an important nesting area for several species of birds. The wildlife habitats described below have been most influenced by the export of water from the Mono Basin.

Lake-Fringing Wetlands: Prior to Mono Basin water exports, Mono Lake supported varied lake-fringing wetlands formed from springs and seeps along its margins as well as unvegetated brackish shoreline lagoons. (SWRCB 7, Vol. 1, p. 3C-11.) An extensive discussion of the historic and modern distribution of lake-fringing wetlands and their geohydrology is contained in SWRCB Exhibits 7 (Appendix Q), 13aa, and 13u.

The EIR consultant delineated eighteen lake-fringing wetland areas at Mono Lake including Paoha Island. (SWRCB 7, Vol. 1, Table 3C-3.) These wetland areas include marshes, wet meadows, dry meadows, alkali meadows and lagoons. A more complete description of the lake-fringing vegetation classification system used in the Draft EIR is included in SWRCB Exhibit 7, Appendix F. A majority of the wetlands were natural, though some were the result of human modifications including irrigation, excavation, or impoundment such as the artificial duck ponds on the Rush Creek delta. (SWRCB 13u, pp. 4 and 21.)

Lake-fringing wetlands serve a number of functions including providing wildlife habitat. Prior to 1941, there were 617 acres of lake-fringing wetlands which included 260 acres of brackish lagoons, 175 acres of dune lagoons, 38 acres on the Rush Creek delta, 29 acres at Bridgeport Beach, 4 acres at Black Point, 3 acres at the Wilson and Mill Creek deltas and 6 acres at DeChambeau Marsh. (SWRCB 7, Appendix D, p. 26.) In addition, there were 356 acres of marsh, wet meadow, and wetland willow scrub. (SWRCB 7, Vol. 1, Table 3C-4.)

Mono Lake Islands and Islets: Mono Lake has two major islands, Negit and Paoha. While both are of relatively recent volcanic origin, there are differences in composition which have biological and lake management implications. Both islands and their islets are potential nesting areas for California gulls and terns.

Negit Island is a 1,700 year old composite volcano composed of two domes, a rocky cinder cone and several lava flows. Part of the island is covered with sandy and silty volcanic ash from the nearby Mono Craters. These areas have been colonized by a greasewood shrub layer. There are no freshwater sources on the island. At a lake elevation of 6,417 feet, Negit Island is flanked by smaller volcanic islets (Krakatoa, Little Norway, Twain, Steamboat and Java) locally covered with sand deposits ranging in size from .223 acres to approximately .010 acres. (SWRCB 13u, Appendix.) The rock composition of the islets and Negit Island resists erosion by waves. (SWRCB 13v, pp. 2-3.) However, the number and size of the islets depends upon the water level of Mono Lake. In 1940, Negit Island consisted of about 162 acres separated from the mainland by 2.5 miles of open water. (SWRCB 7, Vol. 2, p. 3F-3.)

Paoha Island is a large mass of compacted lakebed sediments (mudstones) that were uplifted in a volcanic event approximately 330 years ago. Paoha Island was approximately 1,236 acres in size in 1940. (SWRCB 7, Vol. 2, p. 3F-3.) The mudstones are far less durable than the volcanic material that makes up Negit Island and its islets. (SWRCB 13t, p. 21.) Great Basin scrub habitat, dominated by greasewood and sage, is the most abundant habitat type on Paoha Island. This habitat type provides nesting, escape, and resting cover, as well as foraging habitat for some species. Freshwater springs near the southeast side support emergent marshes and alkali meadows. These springs are an important source of freshwater for most species of terrestrial wildlife on the island. (SWRCB 7, Appendix D, pp. 27-28.) Two saline lakes are located on the northeast end of the island. The recently emerged Paoha islets are composed of the same unconsolidated lakebed sediments originating from a slide from the flank of Paoha Island. The Paoha islets were submerged until

1961 when the water level of Mono Lake fell below 6395 feet. (SWRCB 13v, Appendix.)

Waters of Mono Lake: Eared Grebes, red-necked phalaropes, Wilson's phalaropes, and many species of shorebirds and waterfowl use Mono Lake in the summer and fall for a feeding and resting area before continuing their annual migration. At prediversion elevations, Mono Lake had a salinity of approximately 48 grams/liter. (SWRCB 7, Vol. 1, Figure 3B-1.) Near the mouths of the tributary streams, a phenomena called "hypopycnal stratification" occurs in which the lighter fresh water flowing into the lake floats on the top of the denser saline water already in the lake. (RT XXI, 15:4-15:20; NAS&MLC 178, photo.) This fresh water lens may persist for some time before it becomes mixed by wind-induced waves with the saline water of the lake. (RT XXI, 17:12-17:25.) In many cases, the hypopycnal lenses of fresh water were adjacent to marshes. This important association tended to concentrate waterfowl in marsh areas as depicted in the Dombrowski map of Mono Lake prepared in the late 1940s. (NAS&MLC 176.) Waterfowl could sit in this fresh water lens and drink, rinse salts from their feathers, and be protected from predators, while freely moving back and forth to the adjacent wetlands. Waterfowl were hunted in these areas prior to Mono Basin water exports. (RT XXI, 44:8-44:18.)

Tributary Wildlife Habitats: The streams feeding Mono Lake originate high in the eastern slope of the Sierra Nevada. By the prediversion period, the riparian vegetation along these streams had developed into nearly continuous corridors stretching from Mono Lake to the upper watersheds. Wetlands and meadows at various places along the tributary streams were important wildlife habitats. Below the LADWP points of diversion, the four diverted tributaries supported a combined total of approximately 492 acres of mature woody riparian vegetation and 175 acres of meadow and wetland vegetation. (SWRCB 7, Vol. 1, Table 3C-2.) These areas were used by wildlife for nesting, foraging, resting, and as migratory corridors.