

Is Mono Lake Restored? Have the Creeks Recovered?

Status Report of Restoration Ten Years After Decision 1631

by Lisa Cutting

It's been ten years since the California State Water Resources Control Board's landmark decision to limit Mono Basin water diversions by the Los Angeles Department of Water and Power (DWP). That means ten years of returning flows to Mono Lake's tributary streams and ten years of a rising Mono Lake.

Included in the Water Board's historic decision was a mandate for DWP to develop and implement restoration plans in order to repair over 50 years of damage caused by water diversions.

During the past ten years the Committee has often been asked about the status of restoration—is the lake rising? Have the creeks recovered? Is Mono Lake restored? While much has been accomplished in the last decade, critical achievements are still necessary for a healthy future.

What is Restoration?

The scientists who developed the Mono Basin restoration plans relied upon the dictionary definition of the word restore: to bring back into existence or use; to bring back to an original state. Instead of attempting to just restore past appearances, the plans focused on restoring natural processes and functions, wherever possible, allowing nature to begin the healing process. For example, high flows at the right time of year would transport sediment downstream, which in turn would begin to rebuild the floodplain and provide a fertile substrate for streamside vegetation.

The goal of the restoration plans is to reestablish the habitat conditions and ecological processes that will enable the lake and streams to essentially restore themselves over time. The primary emphasis is on restoring natural processes to the fullest extent possible, although some damaged areas may not ever completely recover.

Prediversion Conditions

A key outcome of the 1994 Water Board proceedings was obtaining testimony that in essence pieced together the prediversion conditions. Historic photos, oral histories from long-time Mono Basin residents, and even some scientific sleuthing uncovered evidence that helped to create a fairly accurate picture of what the Basin was like before 1941. All of this information was important because it clearly laid out the "original state" that is the target of DWP restoration.

The Mono Basin has always been a rich and varied landscape. Before diversions, Mono Lake was a mecca for



Mono Lake's benchmark tufa, 1962, lake level 6394.



1968, lake level 6387.



1995, lake level 6378.



2003, lake level 6382.

Continued on page 4



WALLACE WOOD, SR.

The County Road bridge over lush lower Lee Vining Creek, June 1946.

migratory shorebirds which capitalized on the rich food source of brine shrimp and alkali flies available in the lake's saline waters. Hundreds of thousands of waterfowl used the freshwater lagoons, lake-fringing wetlands, and stream deltas for refuge and feeding.

The streams flowed down from their High Sierra source, lining a meandering path with cottonwoods, willows, and other stream vegetation. As the streams approached Mono

Lake, their flows branched into a multiple channel system across the wide valley bottom. The high groundwater levels and addition of spring water inflow supported lush vegetation over a broad area—creating bottomland oases. This vegetation and spring flow in turn kept the streams cool and provided the habitat diversity needed for trout and other aquatic life to flourish.

The complexity of this inter-related system was all the more critical because it was situated in the Great Basin. The Great Basin is an arid area of sagebrush steppe and desert stretching from Mono Lake to Utah. Because this landscape was and still is cut off from the Pacific storms that bring moisture to the west side of the Sierra Nevada, stream systems and lake habitats in the Eastern Sierra are all the more important as refuge areas for birds and wildlife.

Damage Caused by Excessive Water Diversions

In the mid-1800s the Mono Basin began to see the arrival of settlers. And while streams were diverted for irrigation purposes, most of the water still reached Mono Lake and the streams remained relatively healthy.

It was in 1941 that things began to change significantly—and for the worse. The extension of the Los Angeles Aqueduct from the Owens Valley was completed and four of Mono Lake's tributary streams were diverted and essentially dried up. Streamside forests and trout died. The ability of the streams to function properly was significantly impaired.

Mono Basin Water Diversions How Much Water Gets Diverted When...?

D1631 clearly states the amount of water that DWP can divert to Los Angeles—both before and after Mono Lake has reached its target level of 6391 feet above mean sea level.

Water diversions allowed until Mono Lake reaches 6391

- Below 6377 feet = no diversions allowed
- At or above 6377 feet = DWP can divert up to 4,500 acre-feet of water per year
- At or above 6380 and below 6391 feet = DWP can divert up to 16,000 acre-feet of water per year

Water diversions allowed once Mono Lake reaches 6391

- Below 6388 feet = no diversions allowed
- At or above 6388 and less than 6391 feet = DWP can divert up to 10,000 acre-feet per year
- At or above 6391 feet on April 1 = DWP can divert all available water in excess of the amount needed to maintain channel maintenance and fishery flows, up to the amount otherwise authorized

Note: 6391 is a “trigger” lake level in these rules. When the rules are modeled hydrologically, the long term average lake level is 6392 feet—so you’ll hear both numbers used. And regardless, the lake will fluctuate under these rules as much as eight feet upward and four feet downward.



Irreparable incision on Rush Creek happened when excessive water was released down the creek after years of diversions, left the creek dry and without vegetation to stabilize the banks.

At this time, almost no water was reaching Mono Lake, and in less than 50 years the lake dropped 45 vertical feet, lost half its volume, and doubled in salinity. When stream runoff water exceeded amounts that could be diverted, the high flows came crashing down the creeks, dislodging the desiccated streamside vegetation and straightening the creek channels. Nesting California Gulls became accessible to predators when their once-safe nesting islands became linked to the land. Toxic alkali dust storms resulted from exposed salt flats and waterfowl population sizes crashed to only 1% of their previous amounts.

Continued on page 5



Scientists identified important once-dry stream channels to be opened and rewatered. With water now flowing in this section of Rush Creek, vegetation is returning.



HEIDI HOPKINS

Orders 98-05 and 98-07, such as channel rewatering and cottonwood planting, the majority of restoration work began in 1998.

Hydrologic models estimate that the lake will reach the target level established by the State Water Board by 2014. Mono Lake will still be 25 feet lower than its prediversion level, the streams will carry less flow than they once did, and former cottonwood-willow riparian forests will still be maturing. And some damage will never be restored—most notably the deltas of Rush and Lee Vining Creeks. These two creek deltas will never be the vast wetlands of the past and the lush bottomlands of the past will never fully return to their previous condition.

What Specific Activities Were Ordered

Mono Lake Restoration

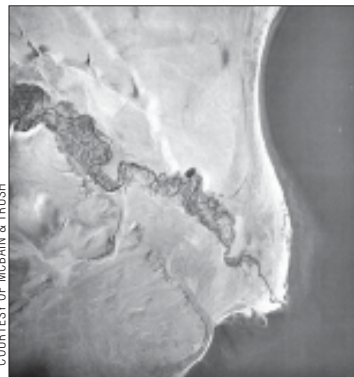
The 1994 Water Board Order set the rules for the restoration of Mono Lake to a healthy level. A target lake level elevation was set—6391 feet above sea level—and a deadline of September 28, 2014 was set to achieve this goal. Mono Lake’s ecosystem—alkali flies, brine shrimp, and gull populations—will be stable at this level and

Continued on page 6

Water Board Decision and Significance

In 1994—after a lengthy series of court battles and public outcry lead by the Mono Lake Committee—the California State Water Resources Control Board issued Decision 1631 (D1631) which set a target lake level for Mono Lake, established minimum flows and annual peak flows that DWP must deliver to the creeks, and also ordered DWP to develop restoration plans for the streams and for waterfowl habitat. D1631 continues to be routinely touted state-wide as a win-win solution because it allowed limited water diversions to the City of Los Angeles while recognizing the water needs of Mono Lake.

The restoration plans were formally adopted in 1998 when the Water Board issued Orders 98-05 and 98-07. These two orders identified specific actions that DWP is required to complete to fulfill its restoration obligation in the Mono Basin. And while some interim restoration activities had already taken place prior to D1631 and



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COURTESY OF MGBAIN & TRUSH

Aerial view of Rush Creek, 1929. Note the wide corridor of vegetation and the multiple stream channels.



COURTESY OF LADWP

Rush Creek, 2002. Vegetation and stream channels are returning.

What Exactly is the Rush Creek Return Ditch? And Why is it so Important?

The Rush Creek Return Ditch is located below Grant Lake Reservoir and is the only way—other than water spilling over the dam—that water gets to the lower portion of Rush Creek. It also serves as the point of diversion for DWP’s water exports to Los Angeles.

The ability of the Rush Creek Return Ditch to carry its maximum amount of water—380 cubic feet per second—is critical to the restoration of Rush Creek. These springtime “peak” flows ordered by the State Water Board are the single-most important component of the restoration process (see main article for details).

Just last year, DWP completed work on the ditch to eliminate seepage and to strengthen the wall of the ditch. These improvements will enable the ditch to transport its full capacity of water.

At the request of the Water Board and the Mono Lake Committee, DWP has agreed to test the new capacity by performing a “flow test” which will gradually increase water flows through the ditch and peak at 380 cfs for two days, then slowly decrease flows. This test will not affect diversion amounts to Los Angeles or the amount of water that Rush Creek will receive under the Water Board decision for this year-type. It is merely to ensure that when flows of this magnitude are required in the future, they will be able to be reliably delivered, to the great benefit of Rush Creek.

Restoration from page 5

shallow flooding will cover areas that currently produce toxic dust storms. Specific diversion amounts allowable by DWP were established and these amounts correspond to lake level—both when the lake is below or above the target management level. (see box on page 4)

Stream Restoration

The stream restoration plan focuses primarily on maintaining flows that mimic the pattern of former natural flows—but not the magnitude, since some water is still being diverted to Los Angeles. Most important to this plan are the specified peak flows—called the stream restoration flows—in the spring and early summer runoff season. DWP was also ordered to open certain side channels in the stream's floodplain in order to spread out the water to raise groundwater levels allowing riparian vegetation to spread out across the floodplain.

Other stream related restoration activities include:

- Rehabilitating the Rush Creek Return Ditch (see box on page 5). This allows for restoration flows to be reliably conveyed to Rush Creek.
- Prohibiting livestock grazing within the riparian corridor



Lee Vining Creek in 1992 with small flags marking recently planted trees along the washed-out stream bank.



The same spot on Lee Vining Creek in 2001 but here the trees have taken root and stabilized the stream bank.



ARNA DEGENHARDT

In 1999 DWP placed large woody debris such as this tree stump in Rush Creek in order to increase habitat complexity. This gives the in-stream habitat a jump-start as it will be a long time before large trees naturally mature and fall into Rush Creek.

- on DWP land for a minimum of ten years. This allows for riparian vegetation to reestablish along the creeks.
- Restoring riparian vegetation to pre-diversion acreage amounts. This will ensure that vegetative habitat complexity is established and self-sustaining.
- Evaluating and implementing ways to pass sediment down the creeks below the diversion structures. This will ensure that fine gravels are available for fish habitat and seed beds for new vegetation.
- Limiting vehicle access in sensitive areas near the streams. This allows vegetation to spread out from the creek edges.
- Removing invasive Tamarisk along lower Rush Creek. Tamarisk, an introduced, invasive plant species, outcompetes native species and must be eliminated in the Mono Basin.
- Placing large woody debris in the creeks. This helps to create habitat complexity in the creeks by creating cover for fish and providing habitat for invertebrates.

Waterfowl Habitat Restoration

The single most important action identified for restoring waterfowl habitat is to raise the level of Mono Lake, and thus recreating shoreline habitat

The Water Board also ordered DWP to implement a controlled burn program with the goal of reestablishing open

Continued on page 7



ARYA DEGENHARDT

A controlled burn in 1999 on the south shore of Mono Lake.

water areas at springs around the shores of Mono Lake that have been identified as essential waterfowl habitat.

Status Report on These Restoration Activities

- The Rush Creek Return Ditch—the means of water conveyance from Grant Reservoir to Rush Creek—was rehabilitated last year and will be tested this summer.
- DWP has physically reopened several side channels on Rush Creek. Others remain on the list and scientists are evaluating potential benefits against any impacts associated with the required mechanical intrusion.
- DWP plans to retrofit the Lee Vining Creek diversion dam this fall with a sediment bypass facility and upgrade to the diversion structure itself thereby insuring the appropriate flow amount is delivered downstream. Walker and Parker Creek sediment bypass evaluation continues.
- DWP conducts annual monitoring of restoration progress in order to chart its course to successfully fulfilling its requirements under the Water Board orders for restoration. Every year a comprehensive report is produced by DWP that documents restoration activities completed, identifies those still outstanding, and summarizes the previous year’s monitoring results.

The DWP monitoring includes:

- Lake level measurements
- Vegetation studies at key sites around the lake
- Aerial photography of stream and lakeshore
- Geomorphic monitoring of stream channels
- Vegetation mapping of the entire stream corridor
- Fish population studies
- Waterfowl surveys

What is Adaptive Management and How Does it Come Into Play?

Adaptive management is an approach that addresses restoration uncertainties by viewing management actions as experiments derived from hypothesis, conducting extensive monitoring, evaluating the results, and then determining if the management and underlying assumptions need to be changed.

Stream restoration flows (SRFs) are a good example of how adaptive management works on the ground. The magnitude, duration, and frequency of the SRFs and the physical actions specified by the Water Board orders were based upon the educated “guesses” of the stream scientists of what was needed for restoration. Because of the uncertainty associated with some of the restoration recommendations, especially the SRFs in wetter years and the ability of DWP to reliably deliver them, the Water Board approved an adaptive management process that the involved parties developed through the legal settlement.

The Water Board specifically ordered that the “stream monitoring shall evaluate and make recommendations, based upon the results of the monitoring program, regarding the magnitude, duration, and frequency of the SRFs necessary for the restoration of Rush Creek; and the need for a Grant Lake bypass to reliably achieve the flows needed for restoration of Rush Creek.” Presently, Grant Lake Reservoir does not have an outlet for reliably delivering the recommended SRFs in wetter years. However, the Committee has agreed to a test period of monitoring the streams and evaluating alternative approaches to delivering the SRF’s to Rush Creek, including augmenting Rush Creek peak flows with Lee Vining Creek diversions. Eventually the stream scientists will make recommendations about whether a Grant Lake Reservoir outlet is needed.

Continued on page 8



ERIN BRANDT

Each summer Committee staff help with monitoring the creeks. Here, Intern Kim Rollins measures groundwater levels using a piezometer on Lee Vining Creek.

When is Restoration “Done”?

In some ways, the Mono Basin restoration as contemplated by the Water Board and scientists may not be “done” in our lifetimes. At the time of the Water Board decision, it was estimated that it would take 20 years for Mono Lake to rise to its management level of 6392 feet. The streams will take even longer to fully recuperate. While riparian vegetation is coming back along the formerly dry channels, the cottonwood seedlings along the stream banks will take 50 years to mature. And rebuilding the floodplain and stabilizing channels will take decades of sediment aggradation and revegetation.

Although restoration will take a long time, DWP’s obligations under the Water Board order may be satisfied much sooner. The restoration orders specify certain “termination criteria” which are essentially stated endpoints that DWP is striving to meet. Once DWP successfully completes these requirements to the Water Board’s satisfaction, DWP will be relieved of any future monitoring obligations.

The termination criteria include:

- Acreage of riparian vegetation, including mature trees of sufficient diameter, height, and location to provide woody debris in the streams
- Length of main channel
- Channel gradient
- Channel sinuosity
- Channel confinement
- Variation of longitudinal thalweg elevation
- Size and structure of fish populations

The Mono Lake Committee’s Role

The successes as well as compromises embodied in D1631 ten years ago were the culmination of a long and hard-fought legal and political battle that was just the beginning of the real work of restoring Mono Lake. The Committee and its dedicated consultants continue to work closely with DWP in the ongoing restoration process.

The Committee is often viewed as the “watchdog” for restoration because we use our presence in the Mono Basin

to stay on top of what is happening day-to-day and month-to-month.

The Committee also attends annual restoration meetings, reviews annual monitoring reports produced by DWP’s consultants, and provides informed comments on any proposed changes to the restoration program. For example, this past year DWP and the Committee worked collaboratively to modify the waterfowl monitoring protocol used to assess waterfowl population numbers in the Mono Basin.

The Committee is in contact with DWP regularly, and especially at critical times of the year such as prior to and during the peak runoff season. The Committee is often viewed as the eyes and ears for DWP since it no longer has as regular a presence in the Basin and the Committee can provide real time information and feedback. The Committee’s current relationship with DWP is one of mutual respect in working to meet the requirements of the Water Board order. And while there certainly are disagreements, there is also commitment from both sides to work together and to resolve issues internally whenever possible.

Prevention Better Than the Cure

The ongoing restoration work at Mono Lake is cutting edge restoration science, but the first and foremost lesson learned is that an ounce of prevention is better than a pound of cure. It is far less expensive to both people and the environment to maintain functioning natural systems instead of damaging them and then trying to restore them later.

In other areas of the state and the world, Mono Lake offers the lesson that it is best to find solutions and collaborative approaches that respect the balance of water needs between human and natural systems in order to prevent the need for restoration.

It is important that Committee members continue to track the restoration process at Mono Lake. One way to stay connected is through the Committee’s Clearinghouse website. There you’ll find all the restoration orders and many of the scientific reports—which provide greater detail related to the ongoing restoration activities occurring in the Mono Basin. ❖

Lisa Cutting is the Committee’s Eastern Sierra Policy Director. She’s been busy practicing her casting for some fly fishing in British Columbia this fall.



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