

# **Upper Owens River Watershed Plan Management Plan March-2007**



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## CONTEXT

### Watershed Approach

The natural unit for considering most water-related issues and problems is the watershed.

A watershed can be simply defined as the land contributing water to a stream or river above some particular point. Natural processes and human activities in a watershed influence the quantity and quality of water that flows to the point of interest. Despite the obvious connections between watersheds and the streams that flow from them, water problems are typically looked at and dealt with in an isolated manner. Many water problems have been treated within the narrow confines of political jurisdictions, property boundaries, technical specialties, or small geographic areas. Many water pollution problems, flood hazards, or water supply issues have only been examined within a short portion of the stream or within the stream channel itself. What happens upstream or upslope has been commonly ignored. The so-called watershed approach merely attempts to look at the broad picture of an entire watershed and how processes and activities within that watershed affect the water that arrives at the defining point. The watershed approach is simply a means of considering water problems in a comprehensive manner.

A companion watershed assessment describes how the 380 square mile watershed influences the quantity and quality of water that flows into the upper Owens River above

the Crowley Lake Dam. The study area has been called the Long Hydrologic Area (and Subarea) and is watershed #603.1 in the Calwater system of watershed delineation (<http://www.ca.nrcs.usda.gov/features/calwater/> and <http://cwp.resources.ca.gov>).

## California Watershed Programs and Mono County's Involvement

Within California, the U.S. Environmental Protection Agency and the state Regional Water Quality Control Boards are the principal agencies charged with minimizing water pollution and maintaining or improving water quality. These entities have been largely successful at reducing water pollution that starts at a known point, such as a sewer outfall from a city or a waste pipe from a factory. As these so-called point sources have been brought under control, the agencies found that pollution from broader areas of land was still degrading water quality. Sediment from dirt roads and bare construction sites, pesticide runoff from farms, nutrients and bacteria from livestock operations, chemicals and oil residues from urban streets are all examples of so-called non-point-source water pollution. The agencies concerned with limiting water pollution have adopted the watershed approach to studying and controlling non-point-source pollution.

In 1997, the Governor's office directed state agencies that deal with natural resources (e.g., State Water Resources Control Board and Regional Water Quality Control Boards, Department of Fish and Game, Department of Conservation, and Department of Forestry and Fire Protection) to coordinate activities on a watershed basis. In March 2000, California voters passed Proposition 13, the Costa-Machado Water Act, which included substantial grant funding for local watershed management activities. In early 2001, Mono County in cooperation with the Mono County Collaborative Planning Team responded to a request for proposals from the State Water Resources Control Board by submitting two proposals to develop watershed assessments and plans. Both proposals were successful, and scopes of work were developed and eventually approved in 2004. Work began on these projects in January 2005.

A watershed assessment for the upper Owens River watershed was completed in 2006. The basic concept of a watershed assessment is to describe any known problems concerning water quantity and quality and attempt to connect those problems with conditions, processes, and activities within the watershed. Such linkages between problems and potential causes can provide the basis for subsequent planning and management that attempt to address the identified problems. The watershed plan reported here follows from and was based upon the upper Owens River watershed assessment.

The watershed plan for the upper Owens River watershed suggests a variety of approaches and measures for addressing some of the water-related issues and problems identified in the assessment. The plan merely offers guidance and proposals. It has no authority itself, and all implementation of suggested policies and actions will rely on decisions of local jurisdictions, agencies, non-profit organizations, and private citizens. A primary recommendation is that the Mono County Collaborative Planning Team assumes the role of overseeing implementation and revision of this plan.

## OVERVIEW OF ISSUES AND PROBLEMS

The watershed assessment found that the upper Owens River watershed has remarkably good water quality and few water problems of “significance”. Any judgmental statement such as the foregoing must be qualified in some context, and the context chosen here is in comparison to the more developed parts of California and the United States. The hydrologic regime and qualities of water within the upper Owens River watershed are certainly not pristine or identical to conditions prior to settlement by EuroAmericans in 1860s. However, conditions are not greatly impaired either. The Clean Water Act of 1972 had a general goal for the nation’s waters to become “fishable and swimmable”. By those criteria, the streams and lakes of the upper Owens River watershed are in good shape. Nevertheless, conditions could be better. This plan suggests how to improve some of those conditions.

A primary challenge is to maintain the current high quality of waters in the upper Owens River watershed. The simple fact that the great majority of the watershed is relatively undisturbed accounts for the good condition of the streams and lakes in the watershed. Wherever the level of disturbance of channels, riparian areas, and uplands increases from natural conditions, water quality and aquatic habitat suffer. The subwatershed of Mammoth Creek is the most developed part of the watershed, and consequently, Mammoth Creek has the greatest departures from natural conditions. Water quality and aquatic habitat are at risk from careless development and construction of roads and structures. The capacity of the watershed to support further changes in land use without significant degradation is unknown, but experience in other areas suggests that all reasonable measures that keep surface runoff, sediment, and pollutants on or near the site of disturbance or at least out of streams minimizes the contribution of that change in land use to degradation of water resources and aquatic habitat.

Problems linked to potential causes

Water quantity

The flow of Mammoth Creek has been substantially reduced by diversion to supply water for the town of Mammoth Lakes. A forthcoming environmental impact report from the Mammoth Community Water District will address this issue in detail.

Current water supplies for the town of Mammoth Lakes are insufficient to meet all anticipated demands because of growth in demand and relatively little storage.

#### Water quality

Accelerated erosion and sedimentation appears related to road and building construction and the Mammoth Mountain Ski Area. Mammoth and Hot creeks are the water bodies most affected by accelerated sedimentation of the past. Much of the local soil erosion from construction, trails, ski runs, and OHV use is unlikely to impact streams because it is not transported far from the site of erosion.

Nutrients in Hot Creek have been released from the Hot Creek fish hatchery.

Microbial contamination of streams is assumed to be caused by careless disposal of human and pet wastes. There is some uncertainty about the long-term effectiveness of household septic systems.

Trace quantities of MTBE and other constituents of gasoline are suspected in Lake Mary from boats and cars on adjacent roads. Such contamination is not known to be significant or require any action.

There is potential, but no direct evidence, for contamination from excessive use of chemical fertilizers on gardens, lawns, and parks. Nutrients from fertilizers that are not incorporated in plant tissue can be leached from soils and enter local streams.

High concentrations of arsenic and nutrients in Hot Creek and the upper Owens River appear to have natural sources, and there is little potential to reduce the amounts of these constituents (except for nutrients released from the fish hatchery).

#### Vegetation change

The risk of catastrophic wildfire is linked to the accumulation of dead fuels and increases in density of forests, woodlands, and shrublands in the absence of a natural fire regime.

Riparian vegetation has been lost and altered by augmented flows in the upper Owens River.

Riparian habitat has been locally impacted by the construction and presence of roads, trails, buildings, and recreational facilities (primarily campgrounds) within the riparian zone.

Wetlands have been drained, filled, and converted to other land uses with a continuing decline in wetland habitat and values.

#### Potential watershed problems and risks

Extensive clearing of vegetation and leaf litter for fire safety may lead to accelerated erosion.

Areas of wetlands remain at risk of drainage and conversion to other land uses.

Much land in the upper Owens River watershed could be available for development if the City of Los Angeles sold any of its properties.

#### Knowledge and information gaps

There are insufficient water quality data to evaluate trends and identify most sources of contaminants. However, an adequate water quality monitoring program is unlikely to be cost-effective.

The sediment budget of Mammoth Creek and Hot Creek is not understood well enough to address and predict the behavior of the sediment pulses moving through Hot Creek.

The groundwater system and stream-groundwater interactions in the Mammoth Creek watershed are not understood. Because of the complex geology underlying the town of Mammoth Lakes, the groundwater system is likely to remain poorly understood and unquantified.

The groundwater system that supplies domestic water for the community of Hilton Creek / Crowley Lake is not sufficiently understood to guarantee sufficient water of adequate quality for continued growth (Team Engineering & Management, Inc., 2006).

The long-term reliability of septic systems with respect to avoiding contamination of nearby wells and streams is unknown.

The long-term effectiveness of the stormwater collection and detention system for the town of Mammoth Lakes has not been demonstrated to minimize or eliminate contamination of lower Mammoth Creek and Hot Creek with sediments and other pollutants.

The hydrologic and ecologic effects of climatic variability and potential trends in climate within the upper Owens River watershed are unknown, but contingency planning seems prudent.

## GENERAL PRINCIPLES OF THIS WATERSHED PLAN

This watershed plan for the upper Owens River watershed is largely based on the following concepts and principles:

- minimizing further disturbance of vegetation and soils, particularly near channels
- implementing “Best Management Practices” to keep surface water, sediment, and pollutants on-site during and after some change in land use, earth-moving, or construction activity
- avoiding disturbance of stream channels and associated riparian areas and removing existing disturbances of riparian areas and channels
- guiding land-use changes away from streams and riparian areas

Most watershed management practices in the upper Owens River watershed that relate directly to some water quality characteristic will need to occur under a cloud of uncertainty. In an ideal situation, contaminants of concern would be carefully monitored, a practice to reduce the contamination would be implemented, and continued monitoring would indicate whether the practice was successful and whether it should be modified in an “adaptive management” strategy. Unfortunately, the cost of intense water-quality monitoring sufficient to reliably demonstrate trends is often prohibitive. Funds for an adequate monitoring program may be better spent on an implementation program that common sense suggests will reduce the negative effects of an activity, even if the reductions cannot be quantified. Nevertheless, there are particular situations where the effectiveness of some practice does need to be quantified. An example might be determining how much sediment is retained by sediment-collection basins below a major construction project or cleared ski run. There is also great potential for bioassessment techniques to indicate general trends in the condition of a waterway.

The U.S. Environmental Protection Agency (2005) has a draft handbook in circulation for developing watershed plans. This handbook is likely to become the standard protocol for addressing nonpoint source pollution through a watershed approach. The draft relies

heavily on the “Total Maximum Daily Load (TMDL)” procedure with respect to particular pollutants that impair a waterbody for certain beneficial uses. The draft handbook summarizes development of a TMDL as follows: “For each impaired waterbody, a state or tribe must develop an accounting of loads that would result in the waterbody’s meeting water quality standards. This is called a Total Maximum Daily Load (TMDL). A TMDL is the amount, or load, of a specific pollutant that a waterbody can assimilate and still meet the water quality standards. The “load” is allocated among the current pollutant sources (point, nonpoint, and background sources), a margin of safety, and sometimes future growth” (U.S. Environmental Protection Agency, 2005).

Although the TMDL approach to non-point source pollution appears to be an effective means of improving water quality in many parts of the nation, the author does not believe this approach has much applicability within the upper Owens River watershed. Without expenditure of considerable funds for research on the quantity and source of contaminants of concern, the ability to assign responsibility for quantifiable reductions of those contaminants would seem impractical, if not impossible. The funds necessary for the research effort would seem better spent implementing Best Management Practices, even though the quantitative effectiveness of those practices would remain unknown.

## MAIN ISSUES and POTENTIAL SOLUTIONS

The following section is a brief outline of some of the major issues followed by a list of concepts and options that could address that particular problem. This initial list is intended to provoke discussion of these issues and potential solutions and is certainly not exhaustive. This list will be updated periodically with additions and amendments.

### **Issues**

#### Potential Solutions

#### Water supply for Mammoth Lakes

- Continue and expand MCWD’s water conservation efforts

- Increase off-channel storage of spring runoff at Horseshoe Lake

#### Degradation of aquatic habitat of Mammoth Creek

- Continue and expand MCWD’s water conservation efforts

- Implement site-specific suggestions of forthcoming MCWD EIR

#### Conversion of wetlands

- Emphasize importance of wetlands in Mono County General Plan

- Develop and implement a tracking system between Mono County, Lahontan

RWQCB, and U.S. Army Corps of Engineers to ensure compliance with existing regulations

Use the BLM-initiated land-tenure adjustment program to trade privately-owned wetland parcels for publicly-owned parcels that could be developed with minimal environmental consequences

#### Excessive concentrations of nutrients and metals

Accept naturally occurring (geologic) sources of contaminants

Redesign operation of Hot Creek fish hatchery to minimize release of nutrients

Current (2007) work at Alpers' Ranch may serve as model approaches

Test outflow from Murphy Gulch retention pond, and, if contaminated, redesign stormwater runoff treatment system

Identify and treat other anthropogenic sources, if suspected

#### Excessive sediment in Mammoth and Hot Creeks

Estimate a sediment budget for Mammoth and Hot Creeks

If budget indicates that sediment is still leaving Murphy Gulch retention pond, then redesign stormwater runoff treatment system

If budget identifies other anthropogenic sources, implement erosion control programs as appropriate and low impact development guidelines

If budget indicates that in-stream sediment is a legacy of past erosion, wait

#### Excessive sediment in other tributaries

Reroute roads away from riparian zones; close rarely used roads; stabilize fords, culverts, and bridges to reduce impact of road-related erosion

Implement low impact development guidelines

#### Channel change of upper Owens River

If natural riparian recovery and bank stabilization along the upper Owens River channel appears inadequate or too slow, a restoration program similar to that for Mono Basin streams should be considered by LADWP and the SWRCB

#### Degradation of riparian habitat

Move roads, trails, and facilities out of riparian zone

Implement low impact development guidelines

#### Fecal contamination

Build additional outhouses and RV dump sites in high-use areas

Educate traveling public about sanitation principles similar to wilderness users

#### Contamination from fertilizers & pesticides

Educate public to reduce use of household & horticultural chemicals

Monitor runoff from golf courses

### Threat of catastrophic wildfire

Continue and greatly expand the fuels management program of the Inyo National Forest

Continue and expand the community-based fire-safe program

Adopt recommendations of current (2006-2007) wildfire hazard study project

### Potential problems of the future (maintain awareness of the possibilities)

Metals leaching from abandoned mines in Lakes Basin

Coliform from pet waste in Lakes Basin, Shady Rest recreation area, and along Mammoth Creek near Sherwin Road

Erosion from OHV use in channels and riparian areas

Erosion from trails and campgrounds within riparian areas

Pasture irrigation (consumptive loss, warm return flow, fish stranding)

Future mining

Future round of small-hydro proposals

Leaching of pollutants from Benton Crossing landfill

Failure of poorly located and/or poorly maintained septic systems

Groundwater contamination by gasoline from historic tanks and spills

Pollution of Lake Mary and Twin Lakes by gasoline and MTBE

## RECOMMENDED POLICIES and PROGRAMS

The main recommendations of this plan are presented in the following format:

Broad goals

Desired future condition

Operational goals / objectives

Potential actions

Potential funding sources

Potential impediments to actions

Recommended implementation program

**Goal:** balance water demand with environmentally acceptable water supply for town of Mammoth Lakes

**Desired future condition:** sufficient water is available for town of Mammoth Lakes without degrading Mammoth Creek or other resources

**Operational goals:** reduce water demand, increase water supply

**Potential actions:** continue and expand MCWD conservation programs, explore feasibility of using Horseshoe Lake as a reservoir (with liner)

**Potential funding source:** MCWD general fund

**Potential conflicts:** people with extensive landscaping that requires irrigation, short-term visitors that don't understand need to conserve water, recreationists that enjoy Horseshoe Lake in its present condition

**Possible program:** ongoing MCWD water conservation program, current MCWD EIR

**Goal:** Maintain & improve aquatic habitat of Mammoth & Hot Creeks

**Desired future condition:** hydrological and ecological processes and properties of in-stream habitat are fully functional

**Operational goals:** increase low flows impacted by diversion, restore riparian vegetation where degraded, reduce nutrient releases from hatchery

**Potential actions:** current MCWD EIR program is expected to contain specific recommendations

**Potential funding source:** MCWD water users

**Potential conflicts:** water supply for Mammoth Lakes, Hot Creek fish hatchery operations, recreational users

**Possible program:** current MCWD EIR program is expected to contain specific recommendations

**Goal:** Maintain existing wetlands

**Desired future condition:** Extent and functions of wetlands have not declined from current status

**Operational goals:** avoid filling, drainage, and other degradation of wetlands

**Potential actions:** do not permit development of wetlands (except as provided under USACE nation-wide permit for single-family lots smaller than half acre); guide development away from wetland margins through careful review of development proposals, educate public, property owners, and real estate / building community about values of wetlands in Mono County; suggest conservation easements on wetland parcels and explore opportunities for land trades with less-sensitive property in public domain

**Potential funding source:** Mono County and Town of Mammoth Lakes general funds, grants for conservation easements through Eastern Sierra Land Trust, BLM land-tenure adjustment program for land trades

**Potential conflicts:** developers and property owners wishing to build in wetlands

**Possible program:** strengthen wetland protection policies in Mono County and Town of Mammoth Lakes general plans, identify privately owned parcels containing wetlands with potential for development and proactively suggest alternatives to development, create a tracking system to coordinate roles of town or county with Lahontan RWQCB and USACE, actively pursue a conservation easement on LADWP lands

**Goal:** reduce fecal coliform pollution

**Desired future condition:** less fecal coliform in streams

**Operational goals:** reduce surface disposal of pet waste, reduce surface disposal of human waste, reduce surface dumping of RV holding tanks

**Potential actions:** educational campaign for pet owners; provide options for disposal of pet waste in heavily used areas (Shady Rest, Lakes Basin, Sherwin Creek Road); construct and maintain more outhouses at staging areas and trailheads; move existing outhouses out of riparian zones; keep Caltrans rest areas open year-round; construct and maintain more RV dump stations and advertise those locations

**Potential funding source:** surcharge on MCWD sewage service dedicated to outhouse and RV dump station maintenance; dedicated portion of campground revenues

**Potential conflicts:** tourism boosters would protest a "Don't poop on Mono County" public education campaign, MCWD would not accept responsibility for regional non-sewered waste disposal; USFS and BLM would not accept costs of more outhouses, Caltrans would not accept costs of year-round rest area maintenance

**Goal:** reduce nutrient load in streams

**Desired future condition:** nutrient concentration in streams approximates natural background levels

**Operational goals:** reduce nutrient pollution from Hot Creek fish hatchery, Alpers Ranch hatchery, and livestock operations

**Potential actions:** continue with ongoing program at Alpers Ranch, transfer that technology to Hot Creek fish hatchery, continue riparian pasture fencing and grazing management program on LADWP leases

**Potential funding source:** current grant to Alpers Ranch, California Department of Fish and Game hatchery operations funds, LADWP land management program

**Potential conflicts:** high cost of improvements at Hot Creek hatchery; higher cost of range management

**Possible program:** continue with ongoing program at Alpers Ranch, transfer that technology to Hot Creek fish hatchery, continue riparian pasture fencing and grazing management program on LADWP leases, encourage private ranches and USFS permittees to keep livestock out of streams and riparian areas

**Goal:** reduce anthropogenic sediment load of streams

**Desired future condition:** bedload and suspended sediment load of streams approximates natural background levels

**Operational goals:** erosion from road surfaces and shoulders is reduced; erosion from grading, construction, and other soil disturbance is kept on site and out of channels

**Potential actions:** remove and rehabilitate roads in riparian areas, remove nonessential stream crossings by roads and restore former crossing sites, restore degraded riparian areas, require sediment containment BMPs for all grading and building permits

**Potential funding source:** USFS road engineering budget, private construction funds

**Potential conflicts:** inadequate funding and massive backlog of Forest Service road maintenance needs, increased costs of construction

**Possible program:** emphasize road impact reduction on Inyo National Forest, strengthen erosion control requirements in county and town general plans, improve erosion control BMP technology transfer within public works and building departments associated with grading and building permits, create a joint county/town position of low-impact development specialist to assist builders and property owners

**Goal:** maintain and improve riparian habitat

**Desired future condition:** intact and fully functional riparian corridors along all streams

**Operational goals:** remove or minimize sources of riparian disturbance and degradation

**Potential actions:** remove and rehabilitate roads in riparian areas, remove nonessential stream crossings by roads and restore former crossing sites, remove campgrounds and other facilities from riparian zones, restore degraded riparian areas, add riparian conservation to Mono County general plan and MEA

**Potential funding source:** USFS road engineering and recreation budgets, grants from state and federal programs for riparian restoration

**Potential conflicts:** inadequate funding for road and campground removal and rehabilitation, recreational users that enjoy streamside campsites, trails, and roads

**Possible program:** emphasize importance of streams and riparian areas in all public planning (e.g., next revision of Inyo National Forest land and resource land management plan, Mono County and Town of Mammoth Lakes General Plans, BLM resource area plan); adopt policies to protect and restore riparian areas; move roads, trails, campgrounds out of riparian areas; maintain adequate setbacks from streams in county and town general plans; actively pursue a conservation easement on LADWP lands

**Goal:** reduce threat of catastrophic wildfire

**Desired future condition:** fuel loads approximate to pre-1850 levels, defensible fuel breaks around communities

**Operational goals:** remove excessive fuels from forests, especially near communities

**Potential actions:** expand and accelerate recent fuel management program of Inyo National Forest

**Potential funding source:** USFS fire management budget, new Congressional appropriations for fuel management

**Potential conflicts:** very high financial costs, aversion to smoke from prescribed burning, potential increase in erosion

**Possible program:** continue and expand fuel management programs of Inyo National Forest, U.S. Bureau of Reclamation, and California Department of Forestry and Fire Protection; continue and expand the community-based fire-safe program; adopt recommendations of current (2006-2007) wildfire hazard study project

### Applicable Best Management Practices

There is an extensive literature of Best Management Practices to minimize erosion and sediment delivery, retain stormwater runoff, reduce nutrient pollution, reduce pesticide pollution, conserve water, maintain aquatic and riparian habitat, restore streams, etc. Some examples directly relevant to Mono County include:

Erosion and nutrient control (Tahoe Regional Planning Agency, 1988)

Erosion control (Sierra Business Council, 2006)

Road construction and maintenance (Sommarstrom, 2001; Caltrans, 2002 and 2003)

Landscaping (Cobourn, et al., 2001)

Construction, development, commercial (California Stormwater Quality Association, 2003)

Although BMPs tend to be very specific and detailed practices, a list of eight principles was distilled by the author of the road maintenance manual for northwestern California (Sommarstrom, 2001):

1. Prevention of erosion is better and cheaper than trying to control erosion.
2. Treat the cause – not the symptom – of erosion.
3. Disconnect the road [or other disturbance] from the stream channel.
4. Protect the riparian zone.
5. Keep existing vegetation wherever possible.
6. Direct runoff away from bare soil or disturbed areas.
7. Keep runoff velocities low.

8. Each solution should not create more problems than it is solving.

Opportunities for governmental agencies and citizens groups

### **Mono County Collaborative Planning Team**

Revive wetlands subcommittee as a means of coordinating implementation and revision of this watershed plan

### **Mono County**

Revise General Plan to emphasize ecological values of streams, riparian areas, and wetlands

Consider county ordinance on water supplies for new development relying on legal logic similar to county's mining ordinance (new development must guarantee replacement water supplies if any damage occurs to existing water users)

Consider county ordinance on riparian protection

Under Mono County direction, small water-supply districts and companies should explore greater cooperation, coordination, and alliances with Mammoth Community Water District

In cooperation with Lahontan RWQCB and U.S. Army Corps of Engineers, create a tracking system for privately-owned wetlands subject to development

Create a joint county/town position of low-impact development specialist to assist builders and property owners (anyone seeking a grading or building permit gets x hours of design assistance to reduce the impacts of their project)

### **Town of Mammoth Lakes and Mammoth Community Water District**

Follow recommendations of current Mammoth Creek EIR process to improve aquatic and riparian habitat

As part of current general plan update, emphasize ecological values of Mammoth Creek as well as water-supply and recreational values

Create a joint county/town position of low-impact development specialist to assist builders and property owners

Evaluate participation in California River Parkways Program as a means of funding to improve habitat of Mammoth Creek while providing low-impact recreational access

Continue water conservation program

### **Inyo National Forest**

Remove roads, trails, and campgrounds from riparian areas

Remove nonessential stream crossings by roads and rehabilitate the affected areas

Continue and expand fuel management program

Build and maintain additional outhouses and RV dump stations

### **Bureau of Land Management**

Continue to manage recreational use and vehicle access in Whitmore / Benton Crossing wetlands area

### **Los Angeles Department of Water and Power**

Continue riparian-pasture grazing management program

Adopt a simple conservation easement preventing subdivision or development of lands

### **Regional Water Quality Control Board – Lahontan**

Continue regulatory program

In cooperation with Mono County and U.S. Army Corps of Engineers, create a tracking system for privately-owned wetlands subject to development

Reevaluate the 303d listings for Twin Lakes, Mammoth Creek, Upper Owens River, and Crowley Lake, particularly the causes/sources

### **California Department of Fish and Game**

Redesign Hot Creek fish hatchery to minimize release of nutrients

### **California Department of Transportation**

Keep Crestview Rest Area open throughout year

### **Sierra Nevada Conservancy**

Provide funds for conservation easements on private parcels with wetlands and riparian areas

### **Eastern Sierra Land Trust**

Continue to encourage private land owners to place conservation easements on property with special resource values

Continue to act as locally-based easement holder and steward

Create a program for conserving wetlands

### **Friends of the Inyo**

Continue restoration projects on Inyo National Forest

Continue to assist Inyo National Forest with route inventory and evaluation

Continue to advocate addition of the Owens River headwaters to the National Wild and Scenic River System

### **California Native Plant Society**

Continue to educate public about values of native plants

### **California Trout**

Continue Deadman Creek restoration work  
Public education and outreach

Providing educational materials to residents, businesses, the construction industry, and visitors is critical to generating support for watershed programs and encouraging personal responsibility for healthy streams and lakes. If homeowners, landscaping contractors, and heavy equipment operators understand that their actions can keep soil in place and out of streams, most are likely to conduct their activities in ways to avoid damaging waterways. Similarly, if pet owners, anglers, and RV drivers understand that proper waste disposal can reduce pollution in streams, most are likely to adopt better waste disposal practices.

The following list of potential educational materials and programs illustrates some of the opportunities to involve private citizens in protecting and improving water quality and aquatic habitat.

Detailed information about Best Management Practices and low-impact development should be available on the county's website as well as in printed form to be distributed with building and grading permit applications. A portion of Mono County's website linked to Community Development, Building, and Public Works Departments could be an online source for watershed and BMP materials. A good model is the website of the Marin County Stormwater Pollution Prevention Program (<http://www.mcstoppp.org>).

A simple educational brochure modeled upon the 2003 publication *Keeping water on the land longer* (U.S. Bureau of Land Management, et al., 2003) could be useful to include with building and grading permit applications.

Pamphlets and brochures on topics such as "what you can do for Mono County's streams", "Mono County's wetlands", "soil erosion and you", "keep exotic plants out of Mono County", and "reducing use of fertilizers and pesticides for healthy streams" could be prepared and distributed to reach a wide audience. The brochure on landscaping with native plants (circa 2002) could serve as a good model.

A public school education program similar to that currently underway in Inyo County and operational within Mono County in 2004 through the Eastern Sierra Watershed Program (<http://www.esice-eswp.org>) should be reintroduced if funding can be found.

## Monitoring

In an ideal world (or watershed), comprehensive monitoring that provides detailed information about physical, chemical, and biological characteristics of the watershed and its water bodies would be highly desirable. Detailed quantitative information and monitoring programs are now required for watershed plans funded with federal Clean Water Act section 319 funds or California proposition 50 (and presumably future state programs) funds (California Water Code section 79078). Unfortunately, such information is generally available only at extraordinary expense, and we must therefore function with uncertainty and incomplete knowledge about our watershed. Except in research settings or under legal orders, quantitative information about the condition of a watershed or waterbody tends to be intermittent, opportunistic, limited in spatial or temporal scale, and of unknown quality. Nevertheless, the occasional spot measurements and observations can provide indications about the state of a watershed or stream and are typically all we have as a basis for decisions and actions (as well as the basis for the watershed assessment accompanying this plan).

The fundamental goal in designing a monitoring program is to relate the monitoring to the goals or objectives – that is, the results of the monitoring should indicate whether or not the objective is being accomplished (e.g., MacDonald, et al., 1991; U.S. Environmental Protection Agency, 2005). Although we would really like to know whether the activities proposed in this plan will measurably reduce the concentration of some contaminant or at least limit further degradation, measurements and analyses necessary for that determination probably won't occur because of lack of funds. So, in our realistic watershed, what sort of monitoring can be accomplished at minimal cost? Perhaps, the best we can expect is to monitor the implementation of BMPs and other actions intended to address a water quality problem or other watershed issue. So-called implementation monitoring is considered the most cost-effective means of reducing nonpoint source pollution because it shows whether the BMP program is actually being carried out (MacDonald, et al., 1991). The effectiveness of a particular BMP must then be taken on faith because of the physical processes involved or from tests reported in scientific literature. The logical vehicle for conducting implementation monitoring of this plan is the Mono County Collaborative Planning Team and its member agencies.

Some sporadic water quality monitoring is likely to occur for various purposes independently of this plan. Hopefully, the Mono County Collaborative Planning Team can take advantage of such measurements as general indicators of water quality trends, even though such measurements are unlikely to be collected at temporal or spatial scales adequate to be definitive of trends over time.

## SUMMARY and CONCLUSIONS

Mono County and other member agencies of the Mono County Collaborative Planning Team have the opportunity to maintain and improve water quality, aquatic habitat, and riparian habitat in the upper Owens River watershed by carefully managing development of land and water resources throughout the area. Because this watershed plan has no statutory authority or interest group behind it, the Mono County Collaborative Planning Team and its member agencies need to adopt, revise, and implement this plan if it is to have any value.

The Mammoth Creek subwatershed is the most disturbed part of the watershed. However, this plan contains few specific recommendations about the Mammoth Creek subwatershed because an EIR on Mammoth Community Water District diversions should be completed in early 2007. That EIR process on Mammoth Creek is anticipated to greatly influence the future diversion of water from the creek and consequently to improve the aquatic habitat. The recommendations of that process can be incorporated in a revision of this plan.

Although this plan for the upper Owens River watershed contains a variety of recommendations and ideas to sustain and improve the health of streams, most of the proposals are linked by a simple guiding principle of avoiding damage and disturbance of soils and vegetation close to water.

## LITERATURE CITED

California Department of Transportation, 2002. Caltrans storm water quality handbooks-project planning and design guide. Sacramento.

California Department of Transportation, 2003. Construction site BMP manual. Sacramento.

California Stormwater Quality Association, 2003. Stormwater best management practice handbooks – development and redevelopment, construction, commercial and industrial, and municipal. Menlo Park.

Cobourn, J., B. Carlos. J. Christopherson, W. Johnson, R. Post, J. Skelly, and E. Smith, 2001. Home landscaping guide for Lake Tahoe and vicinity. Reno: Cooperative Extension, University of Nevada-Reno.

MacDonald, L.H., A.W. Smart, and R.C. Wissmar, 1991. Monitoring guidelines to evaluate effects of forestry activities on streams in the Pacific Northwest and Alaska. EPA 910/9-91-001. Seattle: U.S. Environmental Protection Agency.

National Research Council, 1992. Restoration of aquatic ecosystems. Washington, D.C.: National Academy Press.

Sierra Business Council, 2006. Sediment source control handbook. Truckee: Sierra Business Council.

Sommarstrom, S. 2001. A water quality and stream habitat protection manual for county road maintenance in northwestern California watersheds.

Tahoe Regional Planning Agency, 1988. Handbook of best management practices, volume 2, water quality management plan for the Lake Tahoe region. Zephyr Cove: Tahoe Regional Planning Agency.

Team Engineering & Management, Inc, 2006. Surface water and groundwater availability assessment – Crowley Lake area. Report to Mono County Community Development Department. Bishop.

U.S. Bureau of Land Management, U.S. Forest Service, and Natural Resources Conservation Service, 2003. Keeping water on the land longer. Washington, D.C.?

U.S. Environmental Protection Agency, 2005. Handbook for developing watershed plans to restore and protect our waters. EPA 841-B-05-005. Washington, D.C.

#### Internet sources

Eastern Sierra Watershed Program:  
<http://www.esice-eswp.org>

U.S. Bureau of Land Management land tenure adjustment program:  
<http://gis.mono.ca.gov/LandTenure>

Marin County Stormwater Pollution Prevention Program:  
<http://www.mcstoppp.org>

County road maintenance manual for water quality and habitat protection:  
<http://www.5counties.org/Projects/FinalGeneralProjectPages/RoadsManual800.htm>

California Stormwater Quality Association:  
<http://www.casqa.org> and <http://www.cabmphandbooks.com/>

