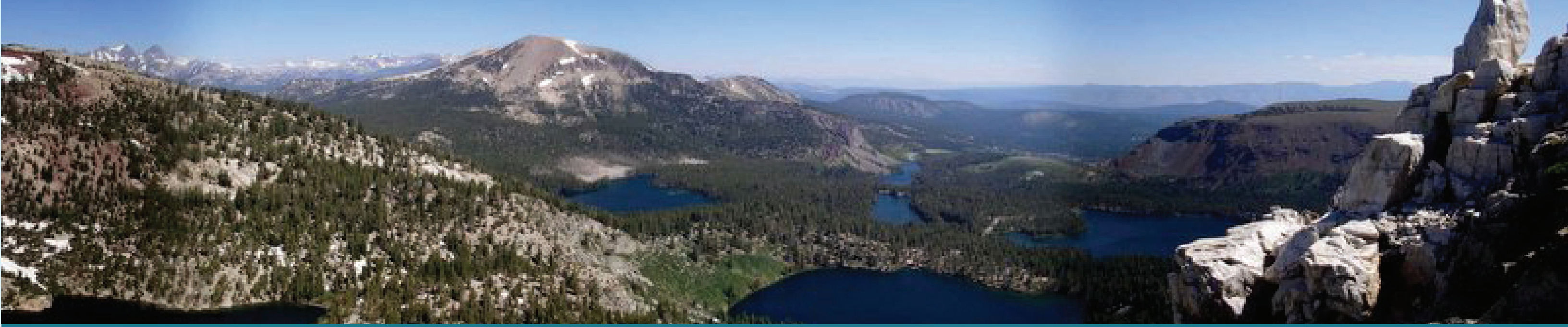

Inyo - Mono
INTEGRATED REGIONAL WATER MANAGEMENT PLAN

January 6, 2011







Prepared by:

Mark Drew, Ph.D., Holly Alpert, Ph.D., Rick Kattelmann, Ph.D., and Austin McInerny, on behalf of the Inyo-Mono Regional Water Management Group

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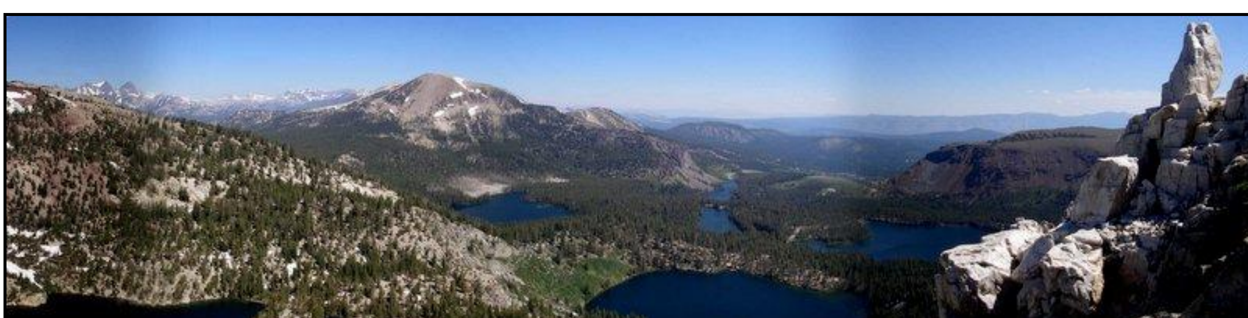
Executive Summary

Almost three years ago, beginning with a few individuals meeting to discuss the potential to develop an Integrated Regional Water Management Plan for the eastern Sierra region, the Inyo-Mono Regional Water Management Group (Group) was established. Initially, the goal of the Group centered on completing a planning grant application that would financially support the development and implementation of an Integrated Regional Water Management Plan. Along the way towards meeting the Group's goal were several unforeseen hurdles, most significantly the State's financial struggles resulting in the delays of Proposition 84 funding and the delayed release of Prop. 84 Plan Guidelines and Planning Grant and Implementation PSPs. In response to such hurdles, the Group has had to maintain an adaptive management philosophy in order for it to remain resilient, stay on track, and ultimately achieve the goal of completing the Phase I Inyo-Mono Integrated Regional Water Management Plan.

The Plan itself is a comprehensive document that among other things describes the planning effort and those involved, the region, water related issues, and strategies to address them. The Plan was developed with the intent of meeting the California Department of Water Resource's Plan requirements to enable the region to become eligible for State funding via Prop. 84 IRWMP allocations. In addition, the Plan was written with the intent of serving and assisting individuals, small water entities, local, state and federal agencies and Counties throughout the planning region in their respective endeavors. Indeed, it is intended that this document becomes a useful resource for those looking to learn about water resources history, management, and needs in the region.

The Inyo-Mono IRWM planning effort has become far more than simply a group of individuals discussing water issues. The effort has resulted in developing relationships, enhancing coordination to address water and other related issues, sharing of expertise amongst participants, developing a stronger voice in State water politics, and more broadly establishing a forum for region-wide communication and support. Moving beyond the historical conflicts in the region, and in the spirit of collaboration, the completion of the Inyo-Mono IRWM Plan is but one concrete example of what the Group has been able to achieve.



Acknowledgements

The Inyo-Mono IRWM Project Staff would especially like to acknowledge Rick Kattelmann for the numerous hours of volunteer time spent creating the Regional Description Chapter. The Staff also wishes to thank Austin McInerny for his tireless efforts in pulling together the entire goals/objectives/strategies process. All of the authors acknowledge the RWMG participants who spent many hours reviewing and commenting on drafts of various chapters and on the entire Plan document. This truly was a grassroots, collaborative effort among all involved in the Inyo-Mono IRWMP. Thank you.

Below is a list of Inyo-Mono RWMG MOU signatories at the time of Plan adoption (December 15, 2010):

Amargosa Conservancy
Big Pine Paiute Tribe
Birchim Community Services District
Bishop Paiute Tribe
Bureau of Land Management - Bishop Office
California Trout
Central Sierra Resource Conservation and Development, Inc.
Eastern Sierra Audubon Society
Eastern Sierra Land Trust
Eastern Sierra Unified School District
Fort Independence Indian Reservation
Indian Wells Valley Water District
Inyo County
June Lake Public Utilities District
Lone Pine Paiute-Shoshone Reservation
Mammoth Community Water District
Mojave Desert Mountain Resource Conservation and Development
Mono County
Mono County Resource Conservation and Development
Mono Lake Committee
Mountain Meadows Mutual Water Company
Owens Valley Committee
Owens Valley Indian Water Commission
Sierra Club Range of Light Group
Town of Mammoth Lakes
Wheeler Crest CSD

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Tables and Figures

Acronyms and Abbreviations

Admin. Committee:	Administrative Committee
CEQA:	California Environmental Quality Act
CWC:	California Water Code
DAC:	Disadvantaged community
DWR:	California Department of Water Resources
EIR:	Environmental Impact Report
GHG:	Greenhouse gas
I-M IRWMP:	Inyo-Mono Integrated Regional Water Management Plan
I-M RWMG:	Inyo-Mono Regional Water Management Group
IRWM(P):	Integrated Regional Water Management (Plan)
MCL:	Maximum Contaminant Load
MHI:	Median Household Income
MOU:	Memorandum of Understanding
NEPA:	National Environmental Policy Act
Prop. 84:	California Proposition 84
PSP:	Proposal Solicitation Package
RAP:	Region Acceptance Process
RWMG:	Regional Water Management Group
RWQCB :	Regional Water Quality Control Board
SWRCB:	State Water Resources Control Board (California)
TMDL:	Total Maximum Daily Load
UWMP:	Urban Water Management Plan

INYO-MONO IRWM Plan Adoption Resolution

APPROVING THE "INYO-MONO INTEGRATED REGIONAL WATER MANAGEMENT PLAN – PHASE I" AND AUTHORIZING MARK DREW, PROJECT MANAGER, TO SIGN THE PLAN AND SUBMIT IT TO THE CALIFORNIA DEPARTMENT OF WATER RESOURCES

WHEREAS, by Memorandum of Understanding ("MOU"), a broad array of governments, agencies, and organizations created the Inyo-Mono Regional Water Management Group ("Group") and,

WHEREAS, the Group intended to prepare an Integrated Region Water Management Plan using funds obtained from the California Department of Water Resources ("DWR") under a Proposition 84 planning grant. However, because of the budget constraints and a funding freeze in late 2008, the Group was not able to obtain planning grant funds. In order to be eligible for the first round of Proposition 84 implementation grants, the Group decided to prepare and submit an initial plan to DWR without the benefit of planning grant funds; and,

WHEREAS, staff and representatives of the Group have prepared the "Inyo-Mono Integrated Regional Water Management Plan—Phase 1" ("Phase 1 Plan") and,

WHEREAS, the Phase 1 Plan is consistent with the Plan Guidelines released by DWR, and it addresses the major water-related issues and needs of the Inyo-Mono planning region; and,

WHEREAS, the Group has applied to DWR for a Round 1 Proposition 84 Planning Grant with the intention of using the funds to revise the Phase 1 Plan to more fully develop certain sections of the plan, including the objectives and strategies and the project review process sections. If the Group receives the requested planning grant funds, it is expected that the revision will be completed in 2012.

THEREFORE, BE IT RESOLVED THAT in accordance with the provisions of the MOU, the members of the Group, acting through the members' designated representatives to the RWMG, hereby approve the Phase 1 Plan and direct the Group's Project Manager, Mark Drew, to sign the Phase 1 Plan and to submit the signed Phase 1 Plan to DWR.

Passed and adopted this 15th day December, 2010, by consensus of a quorum of the Inyo-Mono Regional Water Management Group.

SIGNED:

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Mark Drew
Project Manager, Inyo-Mono Regional Water Management Group

ATTEST: Holly Alpert

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Holly Alpert
Secretary, Inyo-Mono Regional Water Management Group

Chapter 1: Development Process for the Inyo-Mono IRWMP

History, purpose, and status of State of California IRWMP Program

History

State-level water managers in California began to recognize the need for integrated regional water planning in the late 1990s. Over the past decade, California has recognized the value of regional planning and made significant steps in implementing integrated regional water management. In 2002, voters passed Proposition 50, which developed the Integrated Regional Water Management (IRWM) Grant Program as a joint effort between the California Department of Water Resources (DWR) and the State Water Resources Control Board (hereafter State Water Board). Proposition 50 provided competitive grant funding through the IRWM Program for projects that protected communities from drought, protected and improved water quality, and reduced dependence on imported water. Approximately $380 million were made available through two rounds of funding.

Subsequently, voters passed Proposition 84 and Proposition 1E in 2006. These propositions created additional funding through the IRWM Grant Program for projects that assist local agencies to meet the long-term water needs of the State, including delivery of safe drinking water and protection of water quality and the environment. To be eligible for this funding, projects and project sponsors must be involved in a Regional Water Management Group that has adopted an IRWM Plan.

Purpose

The Integrated Regional Water Management Program is intended to promote and practice integrated regional water management to ensure sustainable water uses, reliable water supplies, better water quality, environmental stewardship, efficient urban development, sustainable agriculture, and a strong economy. This planning and implementation framework is intended to comprehensively address challenges of water supply, water quality, flood management, and ecosystem protection and to implement integrated solutions through a collaborative multi-partner process that includes water managers, Native American Tribes, non-governmental organizations, federal, State and local government agencies, and disadvantaged communities. IRWM is a portfolio approach for determining the appropriate mix of water-related resource management strategies, water quality actions, and steps to enhance environmental stewardship for the planning region. The goal is to provide long-term, reliable water supplies for all users at the lowest reasonable cost and with highest possible benefits for economic development, environmental quality, and other societal objectives (CA Water Plan Update, 2009).

Status

Proposition 50 money allocated for the IRWM Program has already been expended through two funding rounds to RWMGs throughout the State. The next round of funding will come from Proposition 84 allocations. This funding has been delayed because of the State budget constraints, and it is expected that the first round of Prop. 84 implementation funding will be available in early 2011, with subsequent rounds to follow.

Eighty-two percent of California's land area is included in an IRWM effort, up from 54% during Prop. 50 funding. Similarly, 98% of California's population is now included in an IRWM region, slightly up from 94% during Proposition 50 funding. During the 2009 Region Acceptance Process, 46 regions submitted applications.

The Inyo-Mono Integrated Regional Water Management Plan (IRWMP) was conceived in early 2008. The Inyo-Mono Regional Water Management Group (RWMG) submitted a Region Acceptance Process application in April, 2009, and was unconditionally approved as a region in November, 2009.

Statewide Priorities for IRWMP

In the Implementation Plan of the California Water Plan Update 2009, the first objective listed is to "promote, improve, and expand integrated regional water management to create and build on partnerships that are essential for California water resources planning, sustainable watershed and floodplain management, and increasing regional self-sufficiency."

DWR's IRWM Grant Program encourages development of integrated regional strategies for management of water resources by providing funding through competitive grants. Eligible projects must implement IRWM plans that meet the requirements of Section 75026 of Proposition 84. IRWM plans shall identify and address the major water related objectives and conflicts within the region, consider all of the resource management strategies identified in the California Water Plan Update, and use an integrated, multi-benefit approach for project selection and design. Plans shall include performance measures and monitoring plans to document progress toward meeting Plan objectives. Projects that may be funded pursuant to this section must be consistent with an adopted IRWM plan or its functional equivalent as defined in the department's Proposition 84 Integrated Regional Water Management Plan Guidelines (hereafter "Guidelines"). Furthermore, funding preference will be given to projects that address one or more of the Statewide priorities as outlined in the Guidelines:

- Drought preparedness
- Use and reuse water more efficiently
- Climate change response actions
- Expand environmental stewardship
- Practice integrated flood management
- Protect surface water and groundwater quality
- Improve Tribal water and natural resources
- Ensure equitable distribution of benefits

The text of Proposition 84 specifically directs that projects funded under the IRWM Program include one or more of the following elements:

1) Water supply reliability, water conservation and water use efficiency.
2) Storm water capture, storage, clean-up, treatment, and management.
3) Removal of invasive non-native species, the creation and enhancement of wetlands, and the acquisition, protection, and restoration of open space and watershed lands.
4) Non-point source pollution reduction, management and monitoring.
5) Groundwater recharge and management projects.
6) Contaminant and salt removal through reclamation, desalting, and other treatment technologies and conveyance of reclaimed water for distribution to users.
7) Water banking, exchange, reclamation and improvement of water quality.
8) Planning and implementation of multipurpose flood management programs.
9) Watershed protection and management.
10) Drinking water treatment and distribution.
11) Ecosystem and fisheries restoration and protection.

Furthermore, Proposition 84 advises that the Department of Water Resources will give preference to IRWM project proposals that meet the following criteria:

1) Proposals that effectively integrate water management programs and projects within a hydrologic region identified in the California Water Plan;

the Regional Water Quality Control Board region or subdivision or other region or sub-region specifically identified by the department.

2) Proposals that effectively integrate water management with land use planning.
3) Proposals that effectively resolve significant water-related conflicts within or between regions.
4) Proposals that contribute to the attainment of one or more of the objectives of the CALFED Bay-Delta Program.
5) Proposals that address statewide priorities.
6) Proposals that address critical water supply or water quality needs for disadvantaged communities within the region.

Inyo-Mono Regional Water Management Group

History

The Integrated Regional Water Management process was initiated in the eastern Sierra in early 2008 with about 15 initial stakeholders in response to funding opportunities provided by Proposition 84. At early stakeholder meetings, the group began to recognize the benefits of having a multiple-agency and multiple-purpose perspective, and that water resource needs in the eastern Sierra are highly interconnected and require a broad and integrated approach to be resolved.

During the pre-planning phase of the Inyo-Mono Integrated Regional Water Management Plan (I-M IRWMP) process, 28 I-M Regional Water Management Group (RWMG) participants signed a voluntary Memorandum of Understanding (MOU). This initial MOU described the governance structure and provided "ground rules" that defined roles and responsibilities, stakeholder engagement, and decision-making for the RWMG. A revised MOU was developed in the first half of 2010 that will govern the group through the planning and implementation phases of the IRWMP process. This MOU took effect November 15, 2010.

Composition and Structure

The I-M RWMG is composed of a main group, an advisory committee, part-time staff, and ad hoc work groups. The RWMG is the largest and most inclusive group and is the main decision-making body for the Inyo-Mono IRWM planning and implementation processes (see Appendix A for a list of organizations that regularly participate in RWMG meetings). As of November 15, 2010, with the implementation of the planning/implementation MOU, only signatories to the

MOU are considered Members of the RWMG and can be a part of the decision-making process. At the end of 2010, there were 26 signatories to the new planning/implementation MOU. However, all organizations involved with the IRWMP, as well as members of the public, are welcome to attend RWMG meetings and provide input on decisions. The RWMG meets in-person at various locations within the planning area approximately once per month.

During the project launch phase, during which the primary objective was to complete a planning grant application (the objective then became completing the Region Acceptance Process), the Coordinating Committee was a subset of the RWMG (which was previously termed the Planning Committee) and served as an advisory or steering group for the Planning Committee, Project Staff, and work groups. Starting November 15, 2010, an Administrative Committee ("Admin Committee") took over the roles and responsibilities of the Coordinating Committee. The Admin Committee is comprised of six RWMG Members (i.e., MOU signatories) that serve on a voluntary basis. Membership on the Admin Committee will rotate through the RWMG. Each year, three new Admin Committee members will be appointed, so that each Admin Committee member will serve for two years, thus providing continuity among years. The first Admin Committee consists of Inyo County, Mono County, Mammoth Community Water District, Bishop Paiute Tribe, Central Sierra Resource Conservation and Development Council, and Mono Lake Committee.

Specialized work groups made up of representatives from the RWMG are established as needed to perform functions, develop programs, and create outputs. Work groups deliver products to the RWMG and the Administrative Committee for approval and/or adoption.

Finally, the Inyo-Mono IRWMP staff consists of a project manager (Mark Drew, Ph.D.) and a project assistant (Holly Alpert, Ph.D.), both of whom work part-time. Both Dr. Drew and Dr. Alpert are based in Mammoth Lakes, CA. IRWMP staff is tasked with the overall coordination and day-to-day operations of the I-M RWMG.

The I-M RWMG and associated MOU signatories are comprised of a broad array of stakeholders throughout Inyo and Mono counties as well as stakeholders from northern San Bernardino and Kern counties, including agencies with statutory authority over water (Appendix A). Currently there are approximately 40 public, private, and not-for-profit entities from the eastern Sierra actively working towards the goal of implementing the IRWM Plan for the region. Those involved represent interests ranging from federal, state, and local government; resource and water agencies; non-profit and conservation organizations; American Indian tribal organizations; educational organizations; business interests; agriculture and ranching groups; and individuals having vested interests in how water is managed in eastern California. There are a number of organizations and individuals that are involved in RWMG activities at a lower level but who maintain regular contact with Project Staff through phone calls and email and stay informed of IRWMP activities. Finally, there are many organizations that are kept on the RWMG contact list but that have not been in communication with Project Staff. These groups are seen as possible future collaborators (Table 1-1). In total, 190 individuals representing about 110 organizations are included in the RWMG contact list and receive emails about meetings, meeting summaries, and other IRWMP-related announcements.

Table 1-1. "Contact list only" RWMG stakeholders. These groups are on the I-M IRWMP email contact list but do not participate in meetings or other IRWMP activities. They are viewed as potential future stakeholders.

Agency/Organization Name	Stakeholder category
Advocates for Mammoth	Community organization
American Land Conservancy	Environmental Stewardship Organization
Bridgeport Paiute Tribe	Native American Tribe
California State Lands Commission	Land use authority
Chalfant Valley Community Service District	Local water agency
Desert Fishes Council	Environmental stewardship organization
Desert Research Institute	University
Eastern Sierra Cattleman's Association	Agriculture group
Eastern Sierra Institute for Collaborative Education	Community organization
Farm Service Agency (NV)	Federal agency
Great Basin Unified Air Pollution Control District	Special district
High Sierra Energy Foundation	Environmental stewardship organization
Hilton Creek Community Service District	Local water agency
Hot Creek Ranch	Local business
Inland Aquaculture Group	Fishing group
Inyo Mono Farm Bureau	Agriculture group
Lee Vining PUD	Local water agency
Mammoth Community Stakeholder Group	Community organization
San Bernardino County	County agency
Sierra Pacific Power	Electrical corporation
Snow Survey Associates	Local business

Agency/Organization Name	Stakeholder category
Southern Sierra IRWMP	IRWMP
SRVA Advocates for Smart Growth	Community organization
TEAM Engineering	Local business
The Wilderness Society	Environmental stewardship organization
UC Cooperative Extension - Inyo and Mono Counties	University

Purposes, mission, and vision

The purpose of the Inyo-Mono IRWMP is to foster coordination, collaboration, and communication among water-related stakeholders in the region for the purpose of developing water management strategies and projects that will benefit multiple entities and enhance water supply, water quality, and watershed health.

After a visioning exercise undertaken in early 2010, the following mission and vision statements were adopted by the Group:

> ***Mission:*** *To research, identify, prioritize, and act on regional water issues, and related social and economic issues, so as to protect and enhance our environment and economy. Working together, we create and implement a regional water management plan that complies with applicable policies and regulations and promotes innovative solutions for our region's needs.*
>
> *Our vision is a landscape that is ecologically, socially, and economically resilient. As diverse stakeholders, we identify and work toward our common goals. We achieve a broad-based perspective that benefits our regional ecosystems and human communities by combining our interests, knowledge, expertise and approaches. We strive to have every voice heard within our region and our collective voice heard in the state and nation.*

Communication, meetings, and workshops

Communication with the Group primarily takes place through email. Notices and agendas for upcoming RWMG meetings are sent to all people on the RWMG email contact list, as are meeting summaries and any other relevant information about the Inyo-Mono IRWM process. In addition, the Project Manager and Project Assistant make themselves available by phone and by email for questions and information requests. When warranted, Project Staff will travel within the region, or to Sacramento, to meet with stakeholders, members of the public, and DWR officials. The project website (www.inyomonowater.org) is another tool used for outreach throughout the I-M IRWM planning region. On this website, visitors can find topics such as introductory information about the I-M IRWMP, member organizations, meeting summaries, and links to other IRWMP groups. It has become evident through various outreach activities, however, that email and the website are not always the best communication or outreach tools in this expansive and largely rural region. Many people in the I-M IRWMP planning region do not have adequate internet access; thus, Project Staff is working to identify the best means to keep everyone informed in the region, such as hardcopy newsletters that are sent via U.S. mail.

I-M RWMG meetings are held approximately once per month. Meetings take place throughout the region, although Project Staff has found that attendance is highest when meetings are held in Bishop or Mammoth Lakes. A call-in option is available during all RWMG meetings for those who cannot or prefer not to attend in person. Administrative Committee meetings are typically held via conference call, as are workgroup meetings. All meetings are open to the public, and as much as possible, meeting notices and agendas are posted to the I-M IRWMP website as well as in public locations and newspapers throughout the region.

Public involvement and outreach

Any member of the public who is interested in water issues within the Inyo-Mono IRWM region is welcome to participate in the Inyo-Mono IRWMP. Initial outreach in 2008 was primarily directed towards engaging stakeholders to be fully involved in the process. At all times, Inyo-Mono RWMG meetings have been open to the public, and notices of the meetings are publicly available on the website (www.inyomonowater.org) and in local media outlets. Throughout 2008, 2009, and 2010, Inyo-Mono Project Staff and other stakeholder volunteers attended numerous public meetings throughout the planning region, with the dual purpose of identifying additional stakeholders for the RWMG as well as providing basic information about the Inyo-Mono IRWMP to members of the public. A primary goal of these outreach efforts has been to identify and reach out to the more remote and rural communities within the region as well as to economically disadvantaged communities (DACs). Many times these two types of communities overlap. Because of the size of the region, it has been difficult to reach every potentially affected stakeholder or community. However, it has been the priority of the Inyo-Mono IRWMP from the beginning to maintain an open, transparent, and inclusive process. The emphasis in these outreach efforts is to inform members of the public about the funding opportunities for local water projects and to stress that the IRWM Program can increase local participation in water management issues.

Disadvantaged Communities

From the beginning of the Inyo-Mono IRWMP process in early 2008, the RWMG made outreach to disadvantaged communities (DACs) a high priority. It was quickly recognized that due to the rural and remote nature of the region, there would likely be a large number of DACs. Indeed, it was discovered that all of Inyo County (the second largest county in California) is a DAC. As described below, the DACs in the I-M IRWMP planning region include unincorporated communities in Inyo, Mono, and Kern Counties, as well as federally-recognized and non-federally-recognized American Indian Tribes.

Throughout the pre-planning and planning phases, effort has been made to reach out to DACs, inform them of IRWMP activities and objectives, and more importantly, listen to their water-related needs and concerns. IRWMP staff has targeted outreach to DACs both with individual meetings/presentations and through the larger outreach campaign implemented in 2010. Of those identified as DACs in Table 1-2 below, all have received some level of outreach and information from the IRWMP, and many have signed the MOU or remain on the RWMG contact list. The Inyo-Mono RWMG is actively pursuing funding from DWR specifically for DAC outreach. Through this funding, additional individual and public meetings will be held throughout the region with the intention of fully integrating as many DACs in the area as possible into the planning process. The I-M RWMG has fully recognized that the success of the IRWMP effort in the region cannot be fully realized without the participation of DACs. Indeed, inclusion of DACs into the process helps to provide a stronger voice in support of the needs of rural communities.

A disadvantaged community is defined as a community with an annual median household income (MHI) that is less than 80% of the statewide annual MHI.[1] The statewide annual MHI in California in 1999 was $47,493. Communities with annual MHIs that are below $37,994 (2000 Census) are considered disadvantaged communities. To begin identifying disadvantaged areas in the I-M IRWM planning region, the MHI was compared at the census tract level using 2000 Census data. Seventeen census tracts within the region, for which census data were available, qualify as disadvantaged communities (Table 1-2). Census data were not available for all communities as some are too small to provide information without identifying individual people. Identified disadvantaged communities are displayed in Figure 1-1.

In 1999, the MHI for the whole of Inyo County was $35,006, which is below the statewide MHI. Eleven communities in Inyo County qualify as disadvantaged; two communities, Darwin and Tecopa, have MHI levels that are below the federal poverty level ($16,600) (Table 1-2). All of the American Indian Reservations, excluding Fort Independence, qualify as disadvantaged communities. The population of the disadvantaged communities in Inyo County in 1999 was 9,496, representing 53% of the total county population. Population growth in Inyo County was slow relative to other counties in California (2.1% from 2000 to 2003), and ranked 41st of 58 California counties for population growth.

[1] State of California legislation AB-1747 (2003).

The MHI for Mono County in 1999 ($44,992) was higher than Inyo County but still below the statewide MHI. Four of the communities in Mono County (for which census data are available) qualify as disadvantaged, accounting for 15% (1,929) of the total population of Mono County. Two of these communities are American Indian Reservations or Colonies, which have MHIs below the poverty level (Benton Paiute Reservation [$11,875] and Bridgeport Indian Colony [$13,750]) (Table 1-2). The population of Mono County (2000) was 12,853; it is one of the slowest growing counties in the state (ranking 47th of 58 counties). Mammoth Lakes, located at the foot of Mammoth Mountain, is the only incorporated town in Mono County.

For both Kern and San Bernardino Counties, only one community within the planning region (Inyokern, of Kern County) qualifies as disadvantaged.

The Inyo-Mono RWMG DAC list and associated data will be updated when 2010 U.S. Census data are available.

Table 1-2. Identified disadvantaged communities in the Inyo-Mono IRWM planning region based on 2000 U.S. Census Bureau data.

Community	***Population[2]***	***Median household income***
Inyo County	***17,945***	***$35,006***
Big Pine	*1,350*	*$37,115*
Big Pine Paiute Reservation	*428*	*$25,938*
Bishop	*3,575*	*$27,338*
Bishop Paiute Reservation	*1,445*	*$26,591*
Cartago	*109*	*$34,375*
Darwin	*54*	*$13,333*
Furnace Creek	*31*	*$25,625*
Independence (county seat)	*574*	*$37,500*
Lone Pine	*1,655*	*$29,079*
Lone Pine Paiute-Shoshone Reservation	*176*	*$18,500*
Tecopa	*99*	*$12,344*
Mono County	***12,853***	***$44, 992***
Antelope Valley[3]	*1,498*	*$34,584*

[2] Source: U.S. Census Bureau, Census 2000 Summary File 1.Data from the US Census Bureau was accessed using the American Factfinder feature on the Census website. Census data is reported by a variety of geographic units, including census tracts, block groups, blocks, and zip codes.

[3] Antelope Valley is located at the northern end of Mono County and includes the communities of Walker, Coleville, and Topaz, the Marine housing complex at Coleville, and Camp Antelope at Walker.

Community	*Population*[2]	*Median household income*
Benton	*331*	*$26,250*
Benton Paiute Reservation	*53*	*$11,875*
Bridgeport Indian Colony	*47*	*$13,750*
San Bernardino County	***1,709,434***	***$42,066***
Kern County	***661,645***	***$35,446***
Inyokern	*984*	*$35,046*

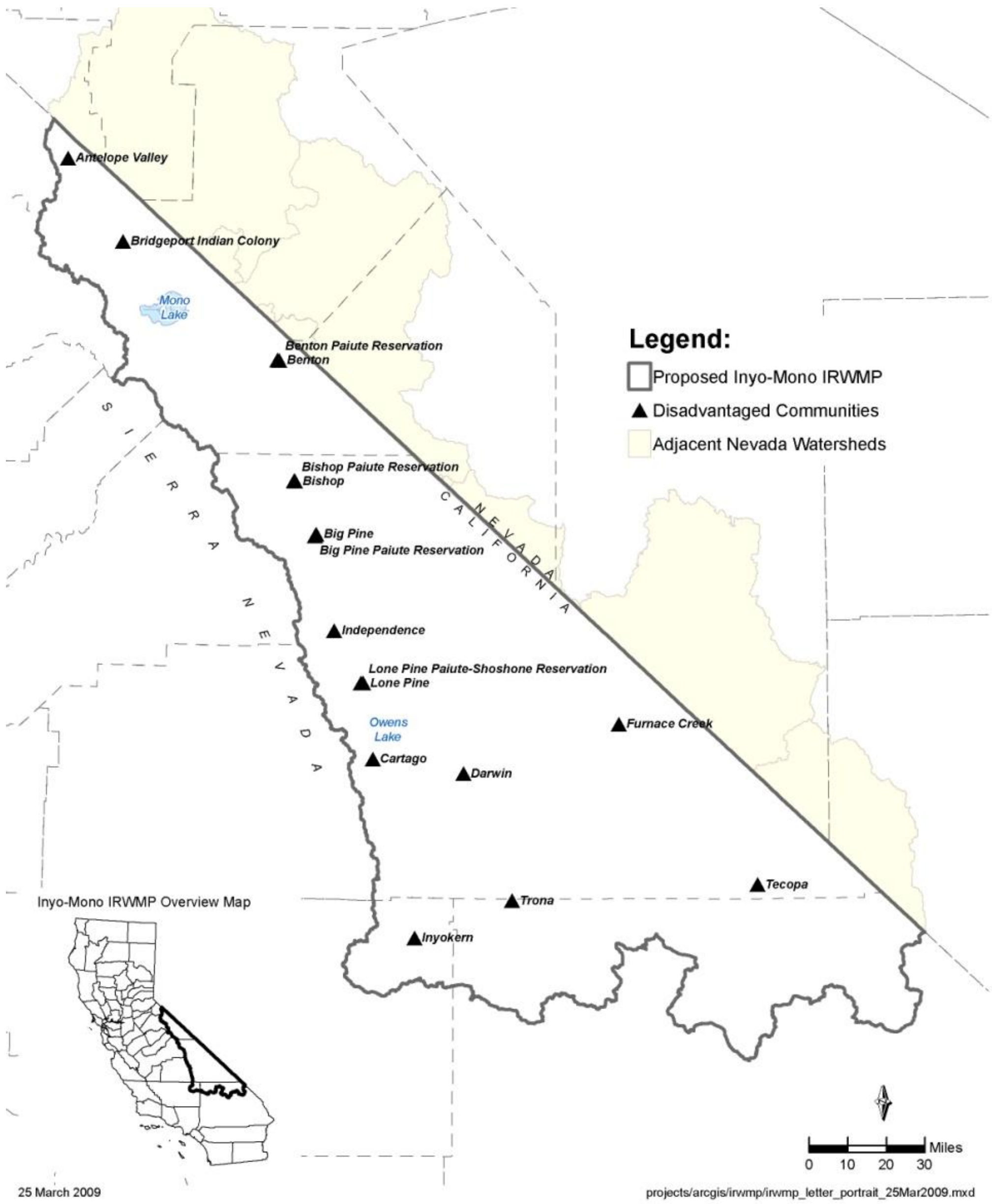


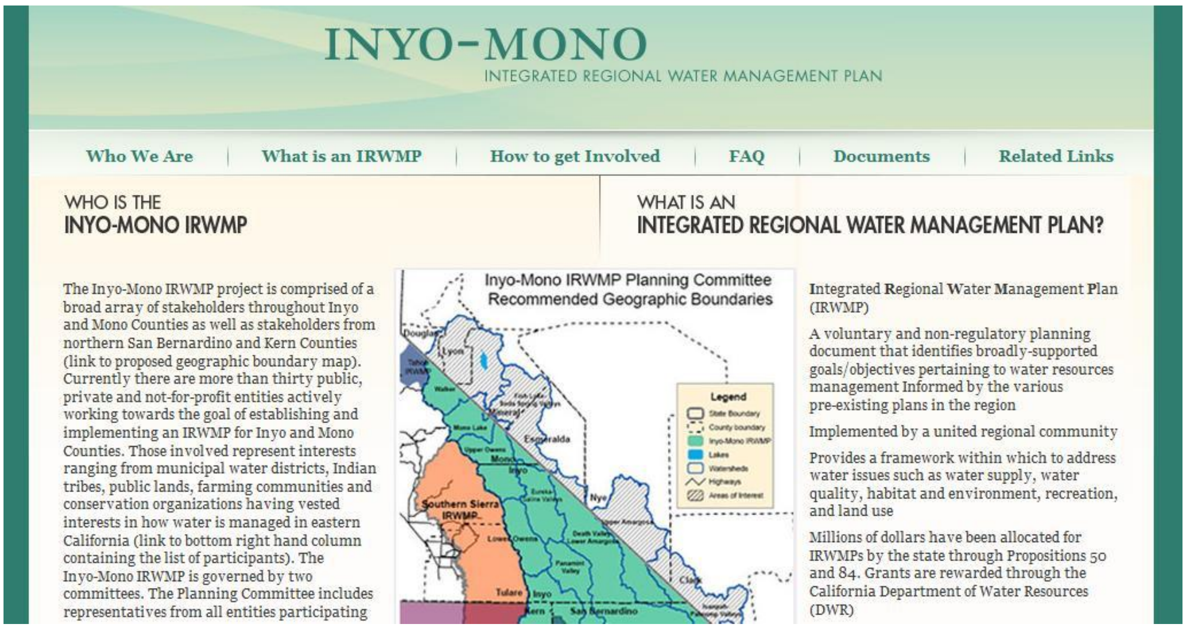
Figure 1-1. Disadvantaged communities in the Inyo-Mono planning region, as determined from 2000 U.S. Census data.

Website

In late 2008, California Trout contracted with a website development firm, using the initial Sierra Nevada Conservancy project launch grant, to create a website for the Inyo-Mono IRWMP. The resulting site, www.inyomonowater.org, is now used as one of the primary tools to communicate with both the RWMG and with the public (Figure 1-2). Currently, the website is maintained by Project Staff with the assistance of RWMG participants with website development experience (on an in-kind basis). On the website, users can find general information about the IRWM

Program and also more specific information on the history, composition, and activities of the Inyo-Mono IRWMP. On the homepage of the website, the calendar section is kept updated with upcoming events (primarily RWMG meetings) and other relevant announcements. In the Documents page, users can access all RWMG meeting summaries to date, the Planning Grant and Region Acceptance Process applications, the MOU, and other relevant documents. All of these documents are made available in either Word or PDF formats. The website also has staff contact information for those who want to communicate with IRWMP staff directly. There are opportunities to improve the website, which will be undertaken in collaboration with RWMG participants as time permits.

Figure 1-2. Partial view of home page of the Inyo-Mono IRWMP website.



Principal water concerns and issues

Through the process of working with RWMG participants and doing extensive outreach to the communities of the I-M IRWM planning region, several principal water issues have been identified.

1. **Water Quality**. Many communities in the Inyo-Mono planning region primarily depend on groundwater as their potable water supply. Due to the chemical composition and weathering processes of the granitic bedrock that underlies much of the region, natural contaminants are commonly found in surface water and groundwater sources, including include arsenic and uranium. As a result, several communities within the planning region exceed state and federal maximum contaminant levels, yet because of the limited resources of many of these rural communities, they are unable to bring their potable water resources into compliance.

Such water quality issues are truly region-wide, from Coleville in the north of the region to Keeler near the center and Tecopa in the southeast corner. Several communities rely on expensive bottled water as their primary source of drinking water.

2. **Water Infrastructure.** Several communities identified concerns about old, outdated, and/or poor-quality water infrastructure. This includes pipes, tanks, wells, diversion structures, and underground mainlines. Poor or failing water infrastructure results in substantial water loss and inadequate fire-fighting capabilities. Many of the smaller communities lack adequate water storage capacity to fight fires. Even though the planning region encompasses a wide variety of landscapes and ecosystems, both water infrastructure and fire water storage concerns are found throughout.

3. **Institutional/Human Capacity**. Although this is not directly a water issue, the RWMG has come to see this as a major obstacle to improving water quality, water supply, and watershed health in the region. Throughout the region, representatives from communities, particularly those that are small and/or disadvantaged, have expressed the need for both technical and financial resources to address water resources issues. Many of these communities lack the expertise necessary to develop engineering plans, go through environmental review, write grant proposals, and implement projects, nor do they have the financial resources to hire outside contractors for these activities. Furthermore, many communities have expressed concern that even after a project is built, they often cannot find the resources to maintain the project, and that quality and project longevity may be compromised as a result.

Mandatory documents (federal and state laws, ordinances, agreements, plans)

The Inyo-Mono IRWM Plan is not a legally binding document; however, many of the member organizations and other stakeholders must adhere to various plans, policies, and regulations that govern water management in the region. Therefore, it is necessary to know of and understand these documents as the Inyo-Mono RWMG develops and implements water resource projects. During the launch phase of the Inyo-Mono IRWMP in 2008, Ecosystem Sciences Foundation staff began developing a list of mandatory documents, as well as collecting the documents themselves. Appendix F lists the names of these documents, a description of each document, whether staff has procured the document, and the location of the document. This list was subsequently updated and is current as of late 2010 and will continue to be updated as necessary to reflect the most recent plans and documents available. Incorporation of local water and land use planning efforts into the IRWM Plan and the Implementation process will be discussed further in Chapter 9 (Inyo-Mono IRWM Plan Implementation).

Approach and relation to other planning efforts

Planning documents that have been completed and/or implemented before the start of or during the process of the Inyo-Mono IRWMP effort are included in the mandatory documents table referenced in the previous section (Appendix F). The Group relies on the knowledge and community involvement of its members to stay informed about new or ongoing planning efforts. Not all planning efforts in the region are relevant to the activities of the IRWMP; however, Project Staff attempts to stay involved with all efforts that may intersect with the interests of the IRWMP. If possible, IRWMP staff attends stakeholder meetings or otherwise communicates with the planning entity to (1) stay updated about the planning effort and (2) to provide input on behalf of the IRWMP, if warranted. For example, in 2010, the Bishop Paiute Tribe Environmental Department received funding to develop a Bishop Creek Watershed Management Plan. IRWMP staff and other RWMG participants have been attending meetings related to the development of the plan and will be providing input to drafts of the plan. The relationship of the Inyo-Mono IRWMP to other planning efforts in the region is further discussed in Chapter 9.

Coordination with other IRWMPs

RWMG participants and Project Staff have communicated and coordinated with other IRWMP regions throughout the State throughout the Inyo-Mono process. During the launch phase, coordination with adjacent and neighboring IRWMP regions was essential to ensure agreement regarding potential common boundaries, overlapping boundaries between proposed IRWMPs, and gaps between existing and proposed IRWMPs. The Inyo-Mono RWMG has made a concerted effort to reach out and collaboratively approach issues associated with boundaries, gaps, and overlap with the several other existing and emerging IRWMP efforts in the region as well as lay the groundwork for future collaboration on shared water resource issues.

An initial meeting among neighboring IRWMP regions took place in 2008 to begin a focused dialogue amongst the various IRWMP RWMGs specific to boundary related issues. During the initial meeting it was agreed by those participating that further coordination would take place. A number of meetings, emails, and phone calls followed in pursuit of formal agreements regarding shared boundaries between regions. These agreements were formalized through signing Letters of Agreement ahead of the 2009 Region Acceptance Process application deadline. The entities included in these letters of agreement were: Tahoe-Sierra IRWMP, Southern Sierra IRWMP, Antelope Valley IRWMP, Mojave IRWMP, and Kern County. At times, Madera and Mariposa Counties were also included in these boundary discussions, although the formation of a RWMG in their area was not finalized.

These meetings with neighboring IRWMP groups allowed the Inyo-Mono IRWMP region to learn how other IRWMP regions formed, invited and involved stakeholders, wrote IRWM Plans, and implemented projects. Inyo-Mono staff has used contacts from other IRWMP regions throughout California, particularly those at advanced stages of IRWM planning, for advice and input throughout the launch and planning phases. The Inyo-Mono RWMG has also begun to look for possibilities of collaborative projects with neighboring IRWMP regions. For example, the Inyo-Mono RWMG co-manages several "areas of interest" with adjacent IRWMPs, such as a portion of northwestern San Bernardino County (with Mojave IRWMP) and two portions of Madera County (part of Mammoth Mountain Ski Area and Devils Postpile National Monument). As funding becomes available for interregional projects, the Inyo-Mono RWMG will seek to increase the strength of these partnerships.

More information on collaboration with neighboring IRWMP regions can be found in Chapter 10 (Coordination) and in Table 10-1.

Integration of stakeholders and institutions

Integration of stakeholders and institutions within the IRWM planning process has been formalized through the monthly RWMG meetings that have been held since February, 2008. At these meetings, representatives from disparate organizations, often with conflicting opinions on water resources topics or representing very different regions, come together to discuss the RWMG and the future of water management in the IRWM region. It is expected that meetings and dialogue that takes place at the meeting will be transparent, open, and respectful. As a result of these ongoing meetings, water-related stakeholders that had not previously known each other now communicate about their needs and seek assistance from one another. For example, smaller water districts in the planning region have recognized that they can learn and draw experience from larger districts, such as the Mammoth Community Water District, and in turn, larger districts have been willing to lend assistance. Another result of these ongoing meetings is that RWMG participants, while recognizing differences, have found that they share many common interests and concerns with respect to water and challenges that stem from living in a rural, remote region. This has created a larger sense of obligation and commitment among the members, which will undoubtedly be manifest in the projects that move forward for funding and in other implementation practices of the group.

Process for Plan development

Phase I vs. Phase II Plan

When the Inyo-Mono IRWMP was initiated in early 2008, it was the intention of the group that it would submit a Prop. 84 Planning Grant application to DWR in late 2008 or early 2009. Because of the budget constraints and the bond freeze in late 2008, the RWMG was not able to fulfill that goal. Instead, the group decided to begin work on an initial Plan, without planning grant funds, so that it could be eligible for the first round of Prop. 84 Implementation grants. Work on the Plan began in earnest in the summer of 2009. This included the development of an outline for the document that reflected the region's specific needs and characteristics as well as the Statewide priorities as set forth in Proposition 84 and the California Water Plan Update 2009. The outline, as well as the initial drafts of several of the chapters, was written with the provision that the release of Proposition 84 Plan Guidelines might require changes in structure and content. When the final Guidelines were circulated, IRWMP staff modified the Plan outline from 2009 to ensure that all Plan standards and other requirements are reflected in the outline and are thus addressed in the document. The Inyo-Mono RWMG has applied for a Round 1 Prop. 84 Planning Grant with the intention of revising the Inyo-Mono IRWM Plan and more fully developing certain sections, such as the objectives and strategies as well as the project review process. It is expected that the Phase II Plan will be completed in 2012.

Incorporation of statewide priorities

Statewide priorities as developed through the IRWM Program as well as those discussed in the California Water Plan Updates have been and continue to be considered by the RWMG. The Group has recognized that the major water-related issues in the Inyo-Mono planning region fall well within several of the State Water Plan and Prop. 84 priorities, and this statewide guidance was used in the development of the group's objectives and strategies. More information on the connection between Statewide strategies and Inyo-Mono objectives and strategies is presented in Chapter 6 (Goals, Objectives, and Resource Management Strategies).

Regional and local issue analysis

Chapters 5 (Outreach and Engagement) and 6 (Goals, Objectives, and Resource Management Strategies) will discuss in more detail the process of learning about and documenting region-wide and local water issues through several focused outreach efforts. These outreach and planning activities provided the ability to delineate the three principal water concerns and issues, as presented earlier in this chapter: water quality, water infrastructure, and institutional/human capacity.

Identification of information gaps

The outreach and engagement process has allowed IRWMP staff and RWMG participants to begin to identify the more obvious information gaps in the region, such as groundwater levels, groundwater flow, and temporal and spatial trends in surface flow (discharge). Through subsequent rounds of project submittals and review, and through additional outreach, it will be possible to further identify and address information gaps, and perhaps more importantly, to identify common information gaps throughout the region. This information will then allow the RWMG to better evaluate projects and target them to specific rounds of IRWM implementation funding and to other funding sources.

Project proposals: submittal, evaluation, screening, and ranking

An initial process for submitting, evaluating, and ranking project proposals was developed for this Plan and for the first round of Implementation funding and is described in detail in Chapter 7 (Project Review Process). This process will be revisited and perhaps revised during the Plan updating/revision process in 2011 and 2012, based upon an evaluation of the process by the RWMG.

Project selection, funding, implementation, and monitoring

The process of selecting and implementing projects is discussed in Chapters 7 and 9.

Adaptive management

Adaptive management in relation to the Inyo-Mono IRWM Plan is discussed in Chapter 9.

Plan revision and future projects

The Inyo-Mono IRWM Plan will be revised as necessary every two years, beginning two years after the Phase II Plan is completed in 2012. The project proposal review process will begin at least six months before the expected deadline for implementation grant submissions. The full process for revising and adding projects to the Inyo-Mono IRWM Plan is discussed in detail in Chapter 2.

Chapter 2: Governance

Group responsible for development of Plan

The Inyo-Mono Regional Water Management Group was the entity responsible for the development of the Phase I Inyo-Mono IRWM Plan. The IRWMP staff, along with a few RWMG participants, was responsible for most of the writing. Other RWMG participants provided specific information for inclusion in the Plan and also helped to review drafts.

Public noticing of Plan development

IRWMP staff developed the following public notice statement for publication in area newspapers, in accordance with §6066 of the Government Code.

> NOTICE OF PREPARATION OF INYO-MONO INTEGRATED REGIONAL WATER MANAGEMENT PLAN
>
> November 15, 2010
>
> The Inyo-Mono Regional Water Management Group intends to prepare an Integrated Regional Water Management Plan to be completed in December, 2010. Any member of the public who wishes to provide input to the document may do so by contacting Holly Alpert, Project Assistant, at holly.alpert@gmail.com by November 29, 2010. The Regional Water Management Group intends to adopt the Plan at its December 15, 2010, regular meeting. This meeting is open to the public. Interested parties can find more information on the Inyo-Mono IRWMP website: www.inyomonowater.org.

This public notice was published for two consecutive weeks in November, 2010, in both the *Mammoth Times* (serving Mammoth Lakes and Mono County) and the *Inyo Register* (serving Bishop and Inyo County). Both of these newspapers are papers of public record for Mono County and Inyo County, respectively. This public notice provided an opportunity for the public to provide input into the Phase I Plan as well as to be present during the adoption of the Plan (during which a public comment period was available).

Plan adoption process

Once the first draft of the Plan was completed, all RWMG participants had an opportunity to read and comment on the document. Changes and comments were discussed at a publicly-noticed RWMG meeting. Staff revised the document in response to comments from the Group and provided a final version using the email contact list. RWMG members then took a finalized version of the Plan to governing boards for their approval, and the Plan was formally adopted by the RWMG at the December 15, 2010, RWMG meeting.

Description of chosen governance structure

The RWMG acts as the forum for MOU signatories and other participants to meet and discuss issues relevant to IRWM Plan development and implementation. The RWMG is the final approval body for the IRWM Plan components, including, but not limited to, goals and objectives, project prioritization, funding proposals to finance and implement the Plan, hiring and overseeing management of consultants and staff, and approving any revisions to the MOU or the Plan itself. RWMG members that have signed the MOU are affirming their commitment to ensuring long-term ecosystem health of the area watersheds; protecting water supply and water quality; involvement of local communities, especially disadvantaged communities; building institutional and human capacity; protection, preservation, and restoration of natural resources of the Inyo-Mono region; and open communication and collaboration.

Throughout the pre-planning and planning phases (2008-2010) of the Inyo-Mono IRWMP, the RWMG met about once per month. RWMG meetings are always open to the public and are posted in local media outlets, on the Inyo-Mono website, and through County Board agendas, in compliance with the Ralph M. Brown Act. Throughout much of the pre-planning phase, RWMG meetings were facilitated by a qualified contracted facilitator from the Center for Collaborative Policy. Due to the State budget freeze in December, 2008, the I-M RWMG was no longer able to employ the services of the facilitator, and the Project Manager became the de facto facilitator for RWMG and (at that time) Coordinating Committee meetings.

Under the November 15, 2010, MOU, an Administrative Committee replaced what was the Coordinating Committee in the pre-planning governance structure. The Administrative Committee is made up of six RWMG members and two alternates. The primary roles of the Administrative Committee are to provide advice and guidance to staff and to help guide the decisions and process of the RWMG. The Administrative Committee helps to review materials to be presented at RWMG meetings, including agendas and other documents. A new role of the Administrative Committee is to help resolve conflict within the RWMG – for example, when consensus cannot be reached on a particular decision item. The Administrative Committee may also play a role in developing substantive proposals, policies, and recommendations at the request and subject to approval of the RWMG, but the Administrative Committee has no decision-making authority. All RWMG members will have the opportunity to serve on the Administrative Committee, on a rotating basis. Three Administrative Committee seats will rotate each year to new members, and three will remain for another year to provide consistency between years. Thus, each Administrative Committee member will serve for two years except three of the initial Administrative Committee appointees, who will serve for one year. The initial Admin Committee consists of Inyo County, Mono County, Mammoth Community Water District, Bishop Paiute Tribe, Central Sierra Resource Conservation and Development Council, and Mono Lake Committee. All Administrative Committee members must represent MOU signatories.

Ad-hoc work groups are formed and directed as needed by the RWMG to undertake work on specific topics or issues and provide input and recommendations to the Administrative Committee and/or RWMG. All results from work groups are reviewed by the RWMG. Ad-hoc work groups have no decision-making authority and are intended to undertake focused work on particular topics and to develop databases, recommendations, and/or queries for the Group to consider. Topics or issues for ad-hoc work groups include, but are not limited to, budget development and review, fundraising, community outreach, Plan objectives and strategies, project development and proposal assistance, issue-specific research and analysis, and oversight of staff and consultant work.

The Inyo-Mono IRWM Project Staff represents the RWMG in meetings with other local, state and regional organizations and agencies, other RWMGs, and the general public. Project Staff oversees consulting contracts approved by the RWMG to assure appropriate and timely results and is responsible for project documentation and timely and accurate reporting to the RWMG, DWR, and other agencies as appropriate. Project Staff also works closely with the fiscal agent and is responsible for working with this entity to assure accurate and timely payment and documentation of IRWM budget expenditures.

Discussion of MOU and decision-making

The Inyo-Mono IRWM process has been divided into phases, and these phases have corresponded to different governance structures. The initial, or pre-planning, phase of the Inyo-Mono IRWMP utilized a Memorandum of Understanding (Appendix B). This MOU provided a management structure that assigned decision-making authority to the RWMG. Only those members of the RWMG that had signed the pre-planning MOU were eligible to participate in the decision-making process, though all interested entities were welcome to attend and participate in RWMG meetings. Entities were invited to sign this MOU at any time; there was no deadline. Indeed, groups signed the pre-planning MOU up until the time that the next iteration of the MOU was being developed. The pre-planning MOU also provided background on the Inyo-Mono IRWMP and described the consensus decision-making process.

As the RWMG moved forward into the planning phase and as the group matured, several participants thought it important to revisit and make changes to the MOU. What resulted was an entirely new MOU that sets forth the purpose of the RWMG, the structure of the RWMG and its decision-making processes, and other items related to staffing, fiscal agent, budget, meetings, and reporting (Appendix C). The planning/ implementation MOU became effective November 15, 2010, and will govern the planning and implementation phases of the Inyo-Mono IRWMP. There will be an opportunity to revisit and make changes and amendments to the MOU once per year, with the first revision period to take place in early 2011.

I-M RWMG decisions on policies and actions are made by consensus at publicly-noticed meetings held in compliance with the Brown Act. In reaching consensus, some members may strongly endorse a particular proposal while others may accept it as "workable". Others may only be able to "live with it". Still others may choose to "stand aside" by verbally noting a disagreement, yet allowing the group to reach a consensus without them. Any of these actions constitutes consensus. If any RWMG member opposes an action, the proposed action fails. It is expected that members in opposition to a particular action will verbally state their concerns during the meeting at which the decision is being made. If no consensus is reached, the matter is turned over to the Administrative Committee so that it can work with the opposing entity(ies) in addressing their concerns and attempting to reach consensus. Since neither the Administrative Committee nor the RWMG has any regulatory authority, any decisions they make cannot regulate or force another entity against its will to take an action not in their interest or against its own regulations or policies. All decisions will be made and developed under the consensus rule. If consensus cannot be reached during the second consideration by the RWMG, "avoided decisions" will be archived and may be reviewed at a later time in order to continue seeking solutions for difficult and important issues for which consensus has not been achieved. This consensus process is designed to achieve the development of a single, collaborative water management portfolio that is prioritized based on the adopted goals and objectives of the RWMG. To date, the consensus process has been employed successfully by the Group.

Discussion of how chosen governance structure addresses various activities

The governance structure and processes of the Inyo-Mono RWMG ensure opportunity for public participation and involvement in the development of the IRWM Plan and in other RWMG activities. All meetings are open to the public, and members of the public may find information about the IRWMP at any time by visiting the Inyo-Mono website. The inclusive nature of the RWMG, along with consensus-based decision-making and extensive outreach efforts on behalf of the RWMG, help to ensure that the Inyo-Mono IRWMP will remain an open and transparent process into the future.

Through more than two years of meetings and discussions, the RWMG has developed a process to ensure that RWMG members' governing boards are provided with consistent and timely information about I-M IRWMP efforts and activities. RWMG meetings are scheduled so that governing boards with strict agenda requirements have opportunity to meet and discuss the upcoming meeting and provide guidance to representatives. Draft agendas are sent out via email for comment and additions by the RWMG, and final agendas, along with meeting location and call-in information, are provided to the RWMG at least one week ahead of the meeting. For most items that will require a decision on the part of the RWMG members, the action item is put on the agenda for discussion at one RWMG meeting with the goal of recommending a decision item for the next meeting. This process provides RWMG members opportunity to discuss the decision with their governing boards and receive guidance for decision-making at the next meeting.

Access and opportunity for participation in Inyo-Mono IRWMP

I-M RWMG members are involved in a variety of ways. At the most basic level, RWMG members attend and participate in Group meetings. A subset of the RWMG members sits on the Administrative Committee, which provides guidance to staff and helps to resolve disagreement within the RWMG. Staff relies on the members of the Administrative Committee, as well as other RWMG participants, to provide feedback and advice on day-to-day decisions and operations. RWMG participants also have opportunities to participate in work groups that perform specific tasks or functions, such as developing budgets for grant proposals, creating project review criteria, or assisting with writing assignments. Because of the large and remote nature of the Inyo-Mono region, many stakeholders mostly participate in RWMG meetings by phone, or if they cannot participate at all, they can stay informed about I-M IRWMP activities through the website, emails, or through contact with staff. Stakeholder involvement is actively sought and welcome at any level.

For stakeholders that are not yet a part of the IRWM process, any member of the public is welcome to attend RWMG, Administrative Committee, and work group meetings. In the summer of 2010, the I-M RWMG decided by consensus that it would abide by the Ralph M. Brown Act in convening and noticing its standing committee meetings. Stakeholders and other members of the public can find meeting information on the I-M IRWMP website as well as at several posted locations throughout the region. Furthermore, each RWMG meeting agenda is presented to the Board of Supervisors of both Inyo and Mono Counties and is part of the public record. Call-in locations are available and open to the public.

Internal and external communication

Communication between staff and the RWMG, and among RWMG representatives, primarily occurs via email. IRWMP staff uses email to send out meeting notices and agendas, documents, announcements, and other relevant material. The project website (www.inyomonowater.org) is used as another primary tool for outreach and communication throughout the I-M IRWM planning region. On this website, visitors can find topics such as introductory information about the I-M IRWMP, member organizations, meeting summaries, and links to other IRWMP groups. Documents that are sent to the RWMG through email are usually also posted to the website. It has become evident, however, that email and the website are not always the best communication or outreach tools in this expansive and largely rural region. Many people in the I-M IRWMP planning region do not have adequate internet access; thus, Project Staff is working to identify the best means to keep everyone informed in the region, such as hardcopy newsletters that are sent via U.S. mail.

External communication of IRWMP matters takes place primarily through the website and through local media sources. The Inyo-Mono IRWMP effort has been visible within local media outlets. The three most widely-read local newspapers have each run several articles about various aspects of the Inyo-Mono IRWMP, including interviews with IRWMP staff and RWMG participants. There are several documented cases of these articles contributing to the involvement of new RWMG participants. More recently, a staff member from one of the local newspapers has been regularly attending RWMG meetings and has been posting meeting announcements and agendas on the newspaper's website. All public notices regarding IRWMP activities – the public notice for development of this Plan, for example – are published in the three regional newspapers.

Long-term implementation of IRWM Plan

It is the intention of the Inyo-Mono RWMG to create an IRWM Plan with a time horizon that goes beyond DWR's current Proposition 84 IRWM Program. Indeed, language in the MOU was selected for the purpose of creating a body to address the region's water resources in a long-term, collaborative manner, whether funding is acquired from DWR or from some other source. The collaborative, diverse, consensus-based governance structure is designed not only to develop a Plan, but to create a robust and adaptable RWMG that will create a single management portfolio to address regional water issues consistent with the goals and objectives of the I-M IRWMP.

Coordination with other IRWM regions, State agencies, and federal agencies

Through the 2009 Region Acceptance Process, the Inyo-Mono RWMG made contact with and met regularly with all neighboring IRWMP regions. These meetings were held to ensure consistency in IRWMP region boundary designations and to set the stage for potential future interregional planning and implementation efforts (see Chapter 9). In addition, the Inyo-Mono RWMG sought guidance from established IRWM groups in the development of its planning grant application and Phase I Plan. The firm commitment on the part of the RWMG to supporting multi-benefit projects and processes will ensure that these relationships with other IRWM groups will continue. The Inyo-Mono RWMG has also been regularly participating in meetings of the Central Nevada Regional Water Authority, a collaborative group comprised of stakeholders from central and northern Nevada, as well as Utah and three counties within California (including Inyo and Mono Counties), that meets regularly to discuss water issues of concern in Nevada and bordering states. Because the Inyo-Mono region shares a border with Nevada and includes common watersheds, it is important to conduct outreach to Nevada stakeholders and understand their water concerns.

Both State and federal agencies are involved in the RWMG and regularly attend meetings. This includes California Department of Fish and Game, U.S. Forest Service, U.S. Bureau of Land Management, U.S. Fish and Wildlife Service, U.S. National Park Service, and U.S. Bureau of Reclamation. Each federal or State entity provides a unique perspective on managing land and water resources. Given that more than 90% of the Inyo-Mono region is comprised of public land, these government agencies are important partners in land and water planning.

The relationship between the Inyo-Mono RWMG and DWR has been important in the development of the I-M governance structure and planning processes. DWR is able to provide useful information from other IRWM groups, along with its own perspective, to help guide the activities of the I-M RWMG.

Integration of stakeholders and institutions

One of the most tangible, yet unquantifiable, benefits of the I-M IRWM process to date has been the practice of gathering water-related stakeholders at meetings on an almost-monthly basis to discuss the group, its activities, and water issues. Many of the organizations sitting at the table have historically been at odds over water issues. While it is not expected that the RWMG will solve all water-related conflicts in the region, many RWMG participants have acknowledged the advantages of increased communication and cooperation among adversaries and allies alike. The process has helped to educate stakeholders about each other's activities and priorities. Smaller water districts have sought advice from larger water districts on technical issues. Less experienced communities benefit by learning from groups with more experience in water management, and in turn, RWMG stakeholders have begun to understand the difficulties of maintaining high-quality water resources and ensuring ecosystem protection in small, rural communities. During the RWMG's visioning exercise in early 2010, several RWMG participants expressed the desire that the IRWMP process should help individual stakeholders overcome conflict and should allow the group to speak with one voice and from common objectives.

Process used to establish Plan objectives

See Chapter 6 for a discussion of the process used to establish Phase I Plan objectives.

Process for completing changes or amendments to the Plan

As with the Memorandum of Understanding, the I-M Group will periodically review the Inyo-Mono IRWM Plan and provide opportunity to change and/or amend the Plan. For minor changes, including corrections and small wording changes, the Plan will be reviewed once every six months. During this semi-annual review period, there will also be opportunity to add, modify, or remove projects to/within/from the Plan (see Chapter 8). Proposed changes to Plan text or projects will be requested by a certain date. These changes will be discussed at a subsequent RWMG meeting. The Group members will then make a recommendation to incorporate approved changes into the Plan, which will go before governing boards and come back to the RWMG for a consensus decision at a subsequent meeting. A similar process will be used for making amendments to the Plan. Amendments suggested during this semi-annual process will be fairly minor and will not substantively alter the Plan's meaning.

The Inyo-Mono IRWM Phase I Plan will be revised based on the Inyo-Mono Group's Planning Grant Application of September, 2010. Several substantive revisions will be made in the Phase II Plan, including revisiting goals/objectives/strategies, the project review process, the project list, and responses to climate change. It is the intention of the Group that these revisions will be completed 12 months after the planning grant contract is signed (estimated completion date: Spring, 2012). Thereafter, the Inyo-Mono IRWM Plan will be reviewed for substantive changes and updates every two years. Expected substantive changes include updates regarding regional description details, water-related policies and plans in the region, climate change impacts and responses, changes to the project list and prioritization, and measuring progress of the Plan implementation, among others. All changes to the Plan, whether they be major or minor, will follow the same process of discussion and decision by the RWMG Members (MOU signatories).

Chapter 3: Regional Description

Overview and boundaries

Explanation of regional IRWM boundary

The Inyo-Mono IRWM planning region covers a large area of the central California portion of the western Great Basin. The planning region consists of several large watersheds with internal drainage and no natural outlet to an ocean. The principal river basins or watersheds of the planning area include (from north to south): West Walker River, East Walker River, Mono Basin, Owens River, Amargosa River and Death Valley, Panamint Valley, and Indian Wells Valley. Several other closed basins are included in the southern portion of the planning area.

Boundaries of the Inyo-Mono IRWM planning region enclose Inyo and Mono Counties, northern portions of San Bernardino County and the northeastern corner of Kern County (Figure 3-1). In the northwest, the Inyo-Mono IRWMP boundary follows the divide between Alpine and Mono county jurisdictions. On the western edge, the Inyo-Mono IRWMP boundary follows the crest of the Sierra Nevada and jurisdictional borders of Mono and Inyo Counties with Tuolumne, Mariposa, Madera, Fresno, Tulare and Kern counties. The southwestern boundary also follows the crest of the Sierra Nevada in Inyo County plus a small portion of Kern County. To the south and southeast, the planning region follows watershed boundaries that share more common water resource issues with Inyo County than with other watersheds in Kern and San Bernardino counties. These watersheds include Indian Wells, Searles, Upper Amargosa, Death Valley/Lower Amargosa, Pahrump-Ivanpah, and Panamint Valleys. The east side of the planning area follows the California-Nevada state line. The Nevada side of the watersheds shared by California and Nevada is recognized as an area sharing water resources issues with the Inyo-Mono IRWMP and are included in the Inyo-Mono IRWM planning area as an “Area of Interest.” Thus, within California, except for the southern boundary where watersheds extend into Kern and San Bernardino Counties, the Inyo-Mono IRWMP boundaries are delineated by both watershed and jurisdictional lines. The planning region is wholly contained within the Regional Water Board Region 6 (Lahontan Region) boundaries.

Inyo County, which makes up most of the Inyo-Mono planning region, is the second largest county in California in total area (10,140 square miles) but has a comparatively small population of about 17,950. Mono County covers approximately 3,100 square miles and has a population of about 9,950 (2000 Census). The region is generally rural and sparsely settled with residents concentrated in and around communities such as Bishop, Ridgecrest, Independence, Big Pine, Lone Pine, Bridgeport, June Lake, and Mammoth Lakes. Primary land uses include livestock grazing (mostly on federally-owned and City of Los Angeles-owned lands), agriculture, and recreation.

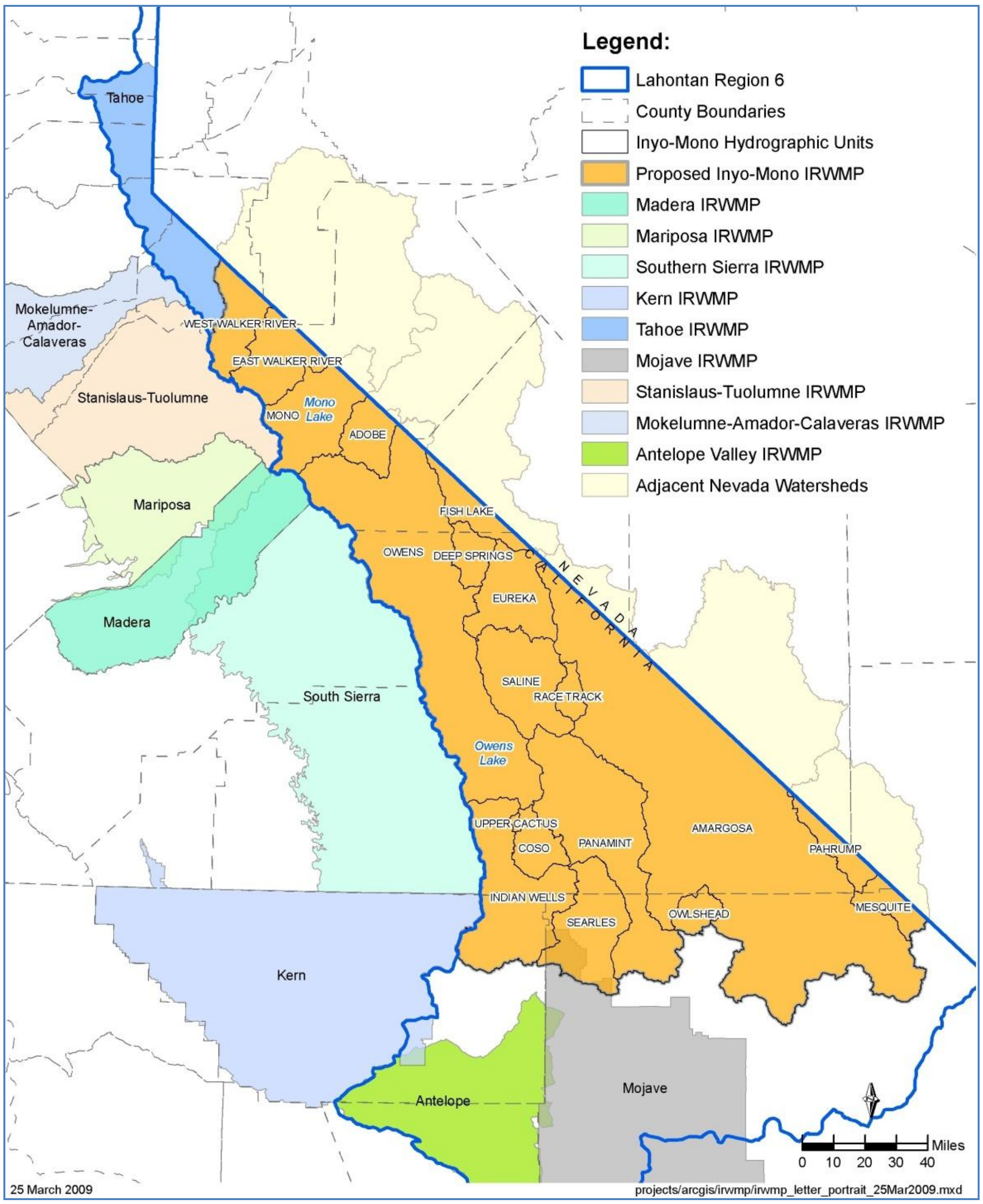


Figure 3-1. Inyo-Mono IRWM planning region (in orange), with neighboring IRWMP regions shown, as well as major watersheds within the Inyo-Mono region and Lahontan funding area boundaries.

Description of watersheds and water systems

Major drainage systems in the region are the Walker, Owens, and Amargosa river systems. The Walker River system flows from the eastern slope of the Sierra Nevada into Nevada where it terminates at Walker Lake. Prior to the construction of the Los Angeles Aqueduct, the Owens River historically terminated at Owens Lake; presently, the Los Angeles Aqueduct is the sole means by which runoff from the region can drain to the Pacific Ocean. The headwaters of the Amargosa River are in Nevada, from which it flows into California, terminating in Death Valley. Numerous other internally drained basins exist wholly within the region, including Mono, Saline, Eureka, Deep Springs, Indian Wells, Panamint, and Searles Valleys. Naturally occurring perennial lakes are uncommon except at high elevations in the Sierra Nevada and in the adjacent valleys receiving runoff from the eastern slope of the Sierra Nevada. The largest natural lake in the region is Mono Lake. Historically, a large lake existed at Owens Lake; however, irrigation for agriculture, drought, and diversions from the Owens River resulted in the lake drying up in the 1930s. Surface water is rare and ephemeral in the arid desert basins south and east of Owens Valley.

The Inyo-Mono IRWM region is comprised of 12-18 large hydrographic units or major watersheds, depending on how certain basins are lumped together in the watershed-delineation schemes of the U.S. Geological Survey and Calwater (Tables 3-1, 3-2, and 3-3). The Calwater basins are illustrated in Figure 3-1.

Table 3-1. Inyo-Mono IRWM region watersheds based on USGS HUC designation.

USGS Hydrologic Unit Code	Watershed Name
16050301	East Walker
16050302	West Walker
16060010	Fish Lake – Soda Springs Valleys
18090101	Mono Lake
18090102	Crowley Lake
18090103	Owens Lake
18090201	Eureka - Saline Valleys
18090202	Upper Amargosa
18090203	Death Valley - Lower Amargosa
18090204	Panamint Valley
18090205	Indian Wells - Searles Valleys
16060015	Ivanpah - Pahrump Valleys

Table 3-2. Inyo-Mono IRWM region watersheds based on Calwater designation.

Calwater Code	Watershed Name
121 8630	East Walker River
122 8631	West Walker River
134 9601	Mono
135 9602	Adobe
136 9603	Owens
137 9604	Fish Lake
138 9605	Deep Springs
139 9606	Eureka
140 9607	Saline
141 9608	Race Track
142 9609	Amargosa
143 9610	Pahrump
144 9611	Mesquite
146 9613	Owlshead
153 9620	Ballarat
154 9621	Trona
155 9622	Coso
156 9623	Upper Cactus
157 9624	Indian Wells

Table 3-3. Correspondence between USGS and Calwater naming conventions

USGS HUC	Calwater
East Walker	East Walker River
West Walker	West Walker River
Fish Lake – Soda Springs	Fish Lake
Mono Lake	Mono
Mono Lake	Adobe
Crowley Lake	Owens
Owens Lake	Owens
Eureka-Saline	Deep Springs
Eureka-Saline	Eureka
Eureka-Saline	Saline
Eureka-Saline	Racetrack
Upper Amargosa	Amargosa

Death Valley – Lower Amargosa	Amargosa
Death Valley – Lower Amargosa	Owlshead
Panamint Valley	Ballarat
Indian Wells – Searles	Trona
Indian Wells – Searles	Coso
Indian Wells – Searles	Upper Cactus
Indian Wells – Searles	Indian Wells
Ivanpah - Pahrump	Pahrump
Ivanpah - Pahrump	Mesquite

The only hydrographic units that are not entirely included in the IRWM planning region are those that cross the Nevada border. The other units are fully contained in the planning region and largely define the rationale for the extent of the planning region. Although the inclusion of areas in southeast Inyo County, northern San Bernardino County, and northeastern Kern County was debated due to the remote nature of the region, it was decided by the RWMG that it was logical to include all of Inyo County yet still make the boundary watershed-based (thus including parts of San Bernardino and Kern Counties). A similar debate and resolution occurred for the northern part of the region in the East Walker River and West Walker River units.

The Inyo-Mono IRWM planning region not only reflects watershed boundaries but areas of common water management history and interest as well. All of the water in the west of our region, east of the Sierra Nevada crest, flows east into water bodies that are important for fisheries, stream habitat, recreation, and water supply for communities in Nevada, southern California, and the planning region itself. The watersheds in the south of the planning region share common issues such as low population density, rural water management, large tracts of federal land, an arid climate, and complex topography. One of the larger hydrographic units in the planning region is the Owens, which spans two counties and provides water to the Los Angeles Aqueduct (LAA) and the four million residents of Los Angeles. Through the Los Angeles Department of Water and Power (LADWP), the City of Los Angeles is a participant Inyo-Mono RWMG meetings. The Inyo-Mono IRWM region boundaries include all water-related infrastructure associated with the source waters of the LAA.

To the south and southeast, the planning region follows watershed boundaries that share more common water resource issues with Inyo County than with other watersheds in Kern and San

Bernardino counties. These watersheds include Indian Wells Valley, Searles, Upper Amargosa, Death Valley/Lower Amargosa, Pahrump-Ivanpah, and Panamint Valley.

Numerous groundwater basins underlie the region, and include Antelope Valley, Bridgeport Valley, Mono Basin, Long Valley, Owens Valley, Mojave, Indian Wells and Searles Valleys, and California Valley Groundwater Basins. California DWR Bulletin 118 groundwater basin areas are shown on Figure 3-2 and listed in Table 3-4. Inyo and Mono Counties have not adopted Groundwater Management Plans, which use existing government bodies and authorities to proactively monitor and manage groundwater resource issues. Instead, the counties have groundwater ordinances in place, which employ land-use planning and police powers of locally elected county boards to manage groundwater resources. The Mammoth Community Water District completed a groundwater management plan for the Mammoth Basin Watershed in July 2005.

Table 3-4. Groundwater basins in the Inyo-Mono IRWM planning region, as designated by DWR Bulletin 118.

Basin Number	Basin Name	Basin Number	Basin Name
6-7	Antelope Valley	6-55	Coso Valley
6-8	Bridgeport Valley	6-56	Rose Valley
6-9	Mono Valley	6-57	Darwin Valley
6-10	Adobe Lake Valley	6-58	Panamint Valley
6-11	Long Valley	6-61	Cameo Area
6-12	Owens Valley	6-62	Race Track Valley
6-13	Black Springs Valley	6-63	Hidden Valley
6-14	Fish Lake Valley	6-64	Marble Canyon Area
6-15	Deep Springs Valley	6-65	Cottonwood Spring Area
6-16	Eureka Valley	6-66	Lee Flat
6-17	Saline Valley	6-68	Santa Rosa Flat
6-18	Death Valley	6-69	Kelso Lander Valley
6-19	Wingate Valley	6-70	Cactus Flat
6-20	Middle Amargosa Valley	6-71	Lost Lake Valley
6-21	Lower Kingston Valley	6-72	Coles Flat
6-22	Upper Kingston Valley	6-73	Wild Horse Mesa Area
6-23	Riggs Valley	6-74	Harrisburg Flats
6-24	Red Pass Valley	6-75	Wildrose Canyon
6-25	Bicycle Valley	6-76	Brown Mountain Valley
6-26	Avawatz Valley	6-77	Grass Valley
6-27	Leach Valley	6-78	Denning Spring Valley

6-28	Pahrump Valley	6-79	California Valley
6-29	Mesquite Valley	6-80	Middle Park Canyon
6-30	Ivanpah Valley	6-81	Butte Valley
6-34	Silver Lake Valley	6-82	Spring Canyon Valley
6-35	Cronise Valley	6-84	Greenwater Valley
6-46	Fremont Valley	6-85	Gold Valley
6-49	Superior Valley	6-86	Rhodes Hill Area
6-50	Cuddeback Valley	6-88	Owl Lake Valley
6-51	Pilot Knob Valley	6-105	Slinkard Valley
6-52	Searles Valley	6-106	Little Antelope Valley
6-53	Salt Wells Valley	6-107	Sweetwater Flat
6-54	Indian Wells Valley		

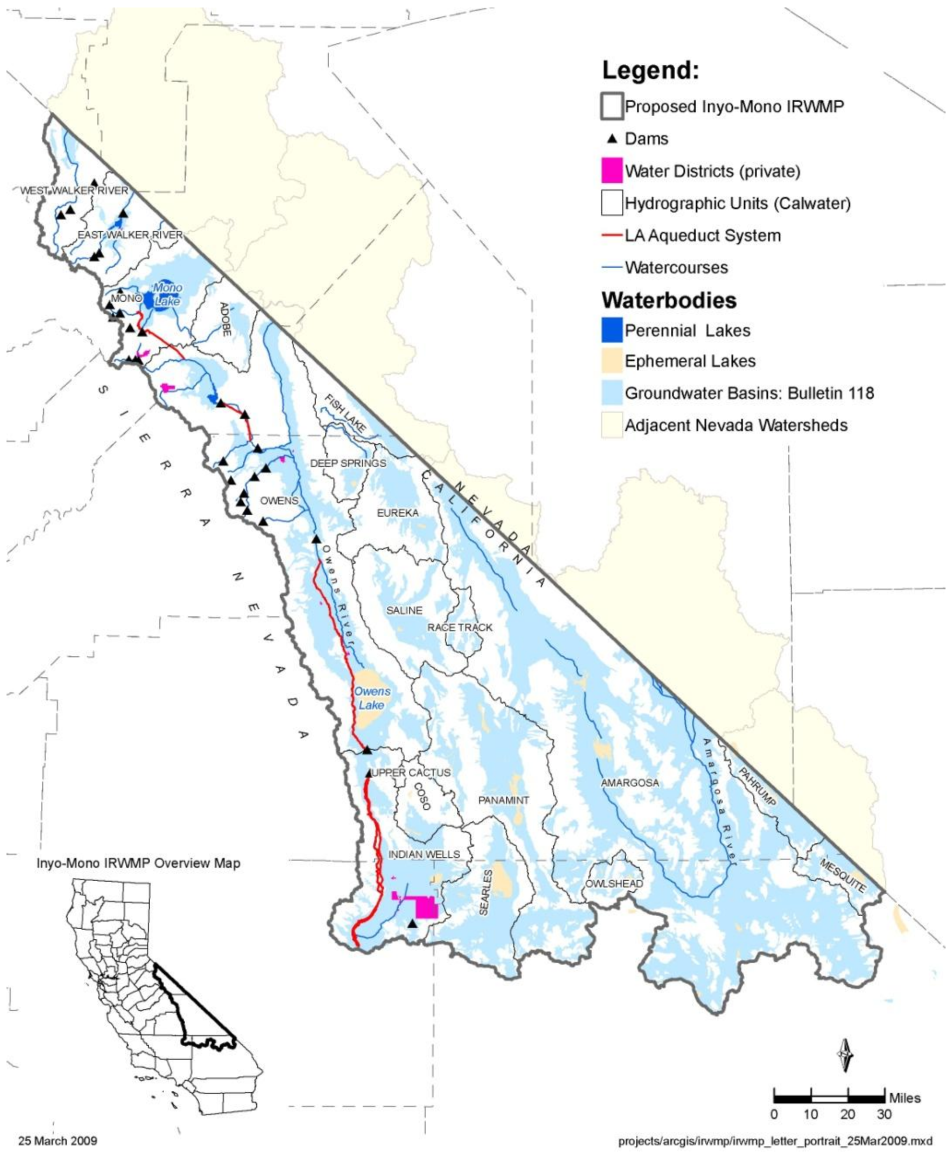


Figure 3-2. Groundwater basins in the Inyo-Mono planning region, as defined by DWR Bulletin 118. Map also shows major water-related infrastructure and water bodies in the region.

Major water systems

Water storage and transfers in the Inyo-Mono IRWM planning area are dominated by the Los Angeles Aqueduct system. All other water engineering within the area is minor by comparison. The project involves extensive infrastructure (Figure 3-2) and vast land holdings (Figure 3-3). Major components of the LADWP water export and power generation system include a series of diversions and a tunnel for exporting water from the Mono Basin to the Owens River headwaters; the Crowley Lake reservoir in Long Valley; diversions in the Owens River Gorge for power generation; hydropower generation on Big Pine, Division, and Cottonwood Creeks; the Tinemaha, Pleasant Valley, and Haiwee Reservoirs; extensive groundwater pumping capacity;

and the Los Angeles Aqueduct (Figure 3-2). Los Angeles' land and water ownership and extensive infrastructure along the east slope of the Sierra link many water management issues in the western part of the Inyo-Mono IRWMP.

Within the Mono Basin, the LADWP constructed diversion works on the main tributaries to Mono Lake except for Mill Creek, a dam creating Grant Lake, and a tunnel to the Upper Owens watershed. Diversions out of the Mono Basin began in 1941 and greatly increased following completion of the second aqueduct in the Owens Valley in 1970. Diversions were halted by court order from 1989 to 1994. Starting in 1995, diversions up to 16,000 acre-feet per year resumed under California State Water Resources Control Board Decision 1631.

In the upper Owens River watershed, Crowley Lake was created by construction of Long Valley dam in the early 1940s. The reservoir is the main storage within the LAA system and has a capacity of 183,000 acre-feet. At the other end of the Owens Gorge, Pleasant Valley Reservoir was built in 1955 to modulate flows released from the hydroelectric facilities in the Owens Gorge. This reservoir can store up to 3,825 acre-feet.

Exports from Owens Valley to Los Angeles vary greatly from year to year (Harrington, 2009):

2002	195,000 AF
2003	219,000 AF
2004	213,000 AF
2005	343,000 AF
2006	368,000 AF

LADWP also operates an extensive dust abatement project on the Owens Lake playa that relies heavily on shallow flooding to control dust. The dust abatement project currently uses about 68,000 acre-feet of water per year and may require up to 90,000 acre-feet.

At the northern end of the Inyo-Mono IRWM region, both the West Walker and East Walker Rivers have been developed for irrigation. Stream diversions, canals, and distribution ditches have irrigated Antelope and Bridgeport valleys for more than a century. In the 1920s, the Walker River Irrigation District constructed reservoirs on both the West Walker and East Walker Rivers. Although water stored in Topaz and Bridgeport reservoirs is exported from the state line-defined watersheds used for the Inyo-Mono IRWM planning area, that water is applied to irrigation within the Walker River Basin, downstream of the state border in Nevada.

Southern California Edison operates a series of dams and powerhouses on Mill Creek, Lee Vining Creek, Rush Creek, and Bishop Creek. The Mammoth Community Water District regulates storage in and discharge from a relatively small lake above the town of Mammoth Lakes.

Figure 3-3. Land ownership in the Inyo-Mono planning region.

Description of internal boundaries

Political boundaries

The Inyo-Mono IRWM region includes Inyo and Mono counties in their entirety and small portions of Kern and San Bernardino counties (Figure 3-1). Ridgecrest is the only city in the region and has a population of about 30,000. Neither it nor the two incorporated towns in the region, Bishop and Mammoth Lakes, cover enough area to have significant political boundaries in the context of the region.

Land ownership and administrative boundaries

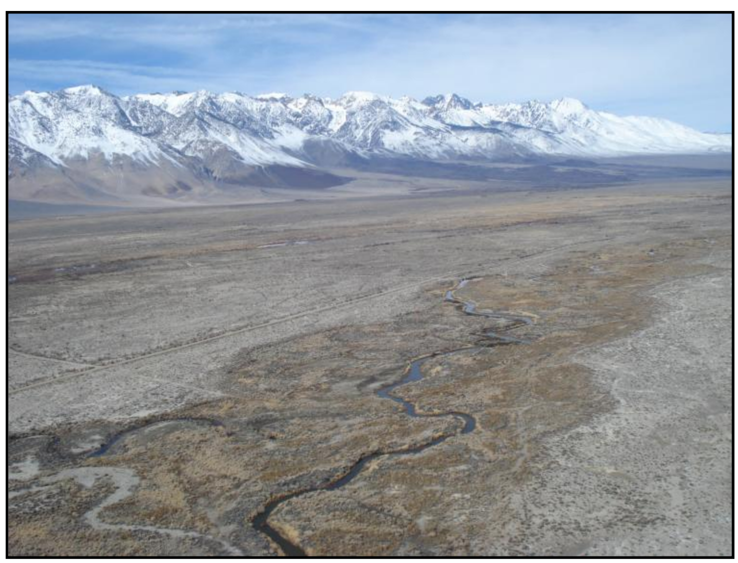
Almost all of the Inyo-Mono IRWM region is public land administered by agencies including USDI-Bureau of Land Management, USDI-National Park Service, USDA-Forest Service, Department of Defense, Los Angeles Department of Water and Power, California State Lands Commission, California Department of Fish and Game, and California Department of Parks and Recreation. Compared to other parts of California, there is remarkably little private or tribal land. The general ownership patterns are illustrated in Figure 3-3. Figure 3-3 also shows the locations of the one city (Ridgecrest), two towns (Bishop and Mammoth Lakes), and some of the small communities (north to south: Coleville, Bridgeport, Lee Vining, Benton, Tom's Place, Laws, Big Pine, Independence, Lone Pine, Keeler, Death Valley, Cartago, Olancha, Shoshone, Tecopa, Trona, and Inyokern).

Several small water districts cover less than one percent of the area of the Inyo-Mono IWRM region (Figure 3-2). The Indian Wells Water District dwarfs the other districts in size and population served.

Identification of neighboring / overlapping IRWM region boundaries

Several IRWM planning groups adjoin the Inyo-Mono region on the west side of the crest of the Sierra Nevada (north to south: Stanislaus–Tuolumne, Mariposa, Madera, South Sierra, and Kern). The Tahoe-Sierra IRWMP meets the northern extent of the Inyo–Mono region along the watershed divide between the Carson and Walker river basins. The Mokelumne–Amador–Calaveras IRWMP does not share a boundary with the Inyo–Mono IRWMP, but it is close to the northern part of our region. The Mojave IRWMP and Inyo–Mono IRWMP share a portion of the Indian Wells–Searles basin within northern San Bernardino County. The Antelope IRWMP is within 20 miles of the southern extent of the Inyo–Mono IRWM region in Kern County. The geographic relationships of the neighboring IRWM regions with the Inyo–Mono IRWM region are illustrated in Figure 3-1.

Descriptive Geography



Climatically and hydrologically, the Inyo-Mono IRWMP can be split into two broad zones: eastern Sierra Nevada and northern Mojave desert. Much of the description that follows in this section generalizes conditions within these two zones. The northern part of the Inyo-Mono IRWMP (West Walker, East Walker, Mono, and Owens watersheds) is the eastern Sierra Nevada zone. The southern and southeastern portions of the planning area (Indian Wells Valley, Searles, Upper Amargosa, Death Valley/Lower Amargosa, Pahrump-Ivanpah, and Panamint Valley watersheds) are the northern Mojave desert zone. Largely because of the far-greater availability of water resources in the eastern Sierra Nevada zone, there is a correspondingly greater amount of information available for the watersheds in the eastern Sierra Nevada zone than those in the northern Mojave desert zone.

Much of the otherwise uncited information in this section is excerpted from assessments of four watersheds in Mono County (Kattelmann; 2007a, 2007b, 2007c, 2010). Because of these sources, there is an obvious bias toward Mono County. This bias results simply from the availability of information. The comparatively small amount of relevant information about the northern Mojave Desert portion of the planning area is reflected in the small proportion of text devoted to the southern area.

Climate and potential for climatic change

The climate of a region can be considered to be the "average" weather as well as the extremes over some period of time. We are usually limited to the historical period and then often only a few decades during which some systematic measurements of precipitation and temperature were made and recorded. The term "normal" is a convention that includes only the past 30 years. Similar to the warnings that accompany a financial investment prospectus, we should remember that past climate is no guarantee of future conditions. Nevertheless, recent climate is the best indicator we have of what to expect in the near future. Where inferences are available regarding prehistoric climate, such information is valuable to suggest the range of extremes that are possible in a given region.

Most of the eastern Sierra Nevada region is subject to the Mediterranean-type climate of California, characterized by wet winters and warm, dry summers, and is subject to the orographic rain shadow effect of being on the lee side of the Sierra Nevada with respect to the prevailing southwest-to-northeast storm direction. An exception to the general rain shadow pattern occurs when small storms travel south from eastern Oregon into Nevada and then produce upslope flow and orographic lifting on the eastern slope of the Sierra Nevada. Storms begin to affect California in October and November and occur at irregular intervals through March in most years. An average of 15 to 20 discrete storms affects central California each winter. Intervals of clear, cool weather lasting one to several days separate these storms, although an extended dry period of three to six weeks occurs in many winters. December, January, and February tend to be the months of greatest precipitation. Storm frequency and intensity typically decrease in April and May, although a few significant storms can occur during the spring. Rain/snow levels of 5,000 to 7,000 feet are typical for most winter storms. The amount of precipitation has been highly variable from year to year.

Summers tend to be dry and warm because of the dominance of high pressure and the absence of a storm track through California during the summer months. Convective thunderstorms occasionally develop when adequate moisture enters the region. When the "Arizona monsoon" pattern delivers moist air far enough west and north, significant thunderstorms can occur each afternoon and evening for several days at a time in the eastern Sierra Nevada.

Precipitation is greatest in the headwater areas just east of the Sierra Nevada crest. There is a steeply declining gradient in precipitation with distance east from the crest. This rain shadow effect is largely due to the descent of air in the lee of the crest, which causes warming and evaporation of clouds (Powell and Klieforth, 2000). The areas immediately east of the crest also benefit from wind-driven carryover of precipitation that resulted from the lifting and cooling on the west side of the Sierra Nevada and some wind transport of snow initially deposited west of the crest. Precipitation increases again as air rises up the various ranges on the western edge of the Basin and Range geologic province (*e.g.,* Sweetwater Mountains, Bodie Hills, Glass Mountains, White-Inyo Mountains).

Annual precipitation measured at a few automated sites and inferred from snowpack measurements has mean values exceeding 30 inches per year above 9,000 feet in the Sierra Nevada and tends to decline from north to south. Annual precipitation amounts decline rapidly to the east of the crest with average amounts of 8 to 12 inches in Antelope Valley, 8 to 15 inches around Mono Lake, 10 inches at Long Valley Dam, and 5 inches at Bishop.

The water equivalence of the snowpack (the depth of water at a point if the snowpack is melted) is measured at about 400 locations throughout the snow zone of California by the Department of Water Resources and cooperating agencies. These measurements are made near the beginning of each month in the winter to supply data for forecasting the amount of snowmelt runoff in streams between April and July. Measurements taken near the beginning of April have been found to approximate the peak accumulation of the snowpack. On the average, storms contribute little additional snowfall after April 1, and snowmelt begins to deplete the water storage of the snowpack in early April. Therefore, the April 1 snow survey measurements have been used in many hydrologic studies as a proxy for the season-long accumulation of precipitation in mountain areas where almost all of the precipitation falls as snow and accumulates throughout the winter. For example, the Mammoth Pass snow course has a continuous record of 79 years (1931 to current [2010]). The long-term April 1 (peak accumulation) average at this site is 43 inches, with a minimum in 1977 of 8.6 inches and a maximum in 1969 of 86.5 inches. Long-term averages of April 1 snow water equivalence from snow courses in the major river basins range from 17 to 51 inches in the West Walker, 18 to 39 inches in the East Walker, 27 to 34 inches in the Mono Basin, 11 to 42 in the Upper Owens, and 10 to 31 inches in the Owens south of Crowley Lake.

The northern Mojave desert zone is characterized by minimal rainfall and great variability in what rainfall does occur. The few precipitation measuring stations in the zone show average annual amounts of only a few inches: 2.4" at Furnace Creek in Death Valley, 4.1" at Trona, 4.8" at Inyokern, 6.7" at Mojave, and 6.9" at Randsburg (source: http://usclimatedata.com). At a U.S. Geological Survey research station in the upper Amargosa watershed (in Nevada, downstream of Beatty), annual precipitation averaged 4.4 inches from 1981 to 2005 and ranged from 0.14 inches to 8.9 inches (Johnson, et al., 2007). Although the bulk of a year's precipitation tends to fall during the winter months, summer thunderstorms can contribute significant quantities of water to isolated areas every few years. In general, summer precipitation tends to be a greater proportion of the annual total in the eastern part of the Mojave zone (Hereford, et al., 2003). The sparse array of precipitation gages cannot capture any indication of the variability of rainfall over the desert zone, but measured rainfall in individual summer seasons varied from 0 to 5 inches (Hereford, et al., 2003). Geomorphic evidence, such as debris flows in some canyons but not adjacent ones, suggests how rainfall exceeding average yearly amounts can occur in a few hours in small areas. Conversely, several months may pass without any rainfall in a particular area.

Within the Indian Wells Valley watershed, average annual precipitation varies from 5 to 10 inches per year, with less than 5 inches per year in the Ridgecrest/China Lake area and in the El Paso Mountains to the south, up to about 6 inches per year in the Argus Range to the east and the Coso Range to the north, and up to about 10 inches per year in the Sierra Nevada (Indian Wells Valley Water District 2002, cited by Couch, et al., 2003). Most of the precipitation occurs between October and March, with a typical peak in January.

Analysis of all available precipitation records from stations in the Mojave Desert (Hereford, et al., 2003) demonstrated substantial variation throughout the 20^{th} century. There appear to have been some persistent patterns in precipitation during the past century: 1893-1904 was relatively dry, 1905-1941 was relatively wet, 1942-1975 was mostly dry, and 1976-1998 was the wettest portion of the century (Hereford, et al., 2003).

Throughout the region, air temperatures vary markedly both seasonally and daily. There is also considerable variation between years for any given day, making averages a poor descriptor (Howald, 2000a). Records of air temperature are even more limited than those of precipitation or snowpack water storage. The small amounts of water vapor in the air and the absence of large water bodies allow the air temperature to fluctuate greatly between day and night compared to more humid parts of the country.

Data from a few stations within the Inyo-Mono planning area illustrate the general air-temperature regime. The mean at Cain Ranch, the station in the Mono Basin with the longest record of air temperature, from 1931 through 1979 was 43ºF with a maximum of 94ºF and a minimum of -18ºF (Los Angeles Department of Water and Power, 1984). Two sites in and near Lee Vining have monitored air temperature for the periods 1950-88 and 1988-2005. The averages from these sites are remarkably close with an average maximum of about 62ºF and an average minimum of about 34ºF (data from Western Regional Climate Center: http://www.wrcc.dri.edu).

A description of air temperatures at Valentine Camp in Mammoth Lakes (Howald, 2000a) provides some insight into the temperature regime of the mid-elevation forest zone. During summer, mean daily maxima ranged between 65°F and 80°F and mean daily minima ranged between 40°F and 50°F. Nighttime low temperatures, especially at ground level, can drop below 32°F at any time of year, although rarely for more than a few hours on even the coldest summer nights. Radiational heat loss in meadows and cold air drainage from surrounding uplands can result in locally low nighttime temperatures. The forest canopy maintains warmer temperatures among the trees. During winter, mean daily maxima ranged between 35°F and 45°F, and mean daily minima ranged between 15°F and 25°F. However, on many winter days, air temperatures do not rise above 32°F. In some winters, minimum air temperatures can drop to about -20°F during outbreaks of polar air (Howald, 2000a).

At the Sierra Nevada Aquatic Research Laboratory on Convict Creek south of Mammoth Lakes, average annual air temperatures from 1988 to 1998 ranged from 40°F to 45°F, with a mean of 43°F. The mean summer air temperature was 59°F, and the mean winter temperature was 19°F. Maximum temperatures in summer ranged from 73°F to 85°F, with summer minimum temperatures between 32°F and 43°F. July and August are typically the only frost-free months, although frost may occur at any time of the year. Winter diurnal temperature fluctuations are less than in summer. Daytime high temperatures ranged from 30°F to 52°F, and nighttime lows ranged from 0°F to 23°F.

Table 3-5. Air temperature (°F) for several stations in the northern Mojave Desert zone (source: http://www.wrcc.dri.edu):

	Monthly Maximum		Monthly Minimum		Annual Average	
Site	**Winter**	**Summer**	**Winter**	**Summer**	**Maximum**	**Minimum**
Haiwee	53	92	30	63	73	46
Inyokern	61	99	32	65	81	47
Trona	61	102	34	70	81	52
Randsburg	55	96	36	66	75	51
Wildrose RS	53	93	31	62	72	45
Death Valley	67	114	41	85	91	62

Water loss to the atmosphere is a large component of the annual water balance of watersheds in arid environments. Because of low atmospheric humidity, abundant solar radiation, high air temperatures, and moderate wind speeds, there is great potential for large amounts of water to evaporate throughout the Inyo-Mono planning area, especially in the northern Mojave Desert zone. However, water is usually not available to be evaporated; therefore, actual evapotranspiration (evaporation from open water and soils plus transpiration from plants) is a limited fraction of potential evapotranspiration at the watershed scale.

Significant water loss occurs where water is available, principally from lakes and from phreatophytes (plants with roots accessing the local water table). Evaporation from the larger natural lakes in the Inyo-Mono planning area has been estimated in a few studies. Open water evaporation from Mono Lake was estimated at about 40-45 inches per year in several studies through the 1960s and at 39 inches per year by the Los Angeles Department of Water and Power (1984). An estimate of 48 inches per year (apparently derived from a 1992 modeling study) was used in an EIR water balance (Jones and Stokes Associates, 1993a: Appendix A). Evaporation from June Lake has been estimated as 38 inches per year (California Department of Water Resources, 1981). Open-water evaporation from lakes above 9,000 feet has been estimated at about 20-25 inches per year, and is limited by ice cover.

Evaporation has also been estimated from some of the region's reservoirs. The average annual total loss at Topaz Lake was 69 inches. Average annual evaporation from Grant Lake, which has winter ice cover, has been variously estimated at 26, 36, and 43 inches (Lee, 1969; Los Angeles Department of Water and Power, 1987). Evaporation has been measured by the LADWP at the Long Valley dam during ice-free months with evaporation pans both in the lake and on shore. The pan located on land had an average loss from eight non-freezing months of 41 inches, and the floating pan lost an average of 52 inches over nine non-freezing months (Jones and Stokes Associates, 1993a: table 3A-4).

Potential evapotranspiration as estimated from water loss in evaporation pans exceeds 100 inches per year at two sites in the northern Mojave Desert zone. At Mojave from 1948 to 2005, the average water loss is 112 inches per year, with a monthly high in July of 17 inches. At Death Valley from 1961 to 2005, the average annual amount is 140 inches. At this site, the maximum monthly amount is 21 inches in July (source: http://www.wrcc.dri.edu/htmlfiles/westevap.final.html).

Actual evapotranspiration has been estimated in a few studies within the Inyo-Mono planning area. In the Mammoth Creek watershed, actual evapotranspiration was estimated to average 13 inches over the watershed area (California Department of Water Resources, 1973). In the Mono Basin, Vorster (1985) estimated an average growing season evapotranspiration rate of 24 inches. Evapotranspiration in the Antelope Valley area was estimated as 33,000 AF from agriculture and 3,600 AF from phreatophytes (Glancy, 1971).

Although water managers would like climate and other environmental conditions to remain "stationary" over time so that measurements in the recent past can indicate what to expect in the future, we are well aware that conditions do change over time. Paleohydrologic studies suggest that both severe floods and extended droughts have occurred in the Inyo-Mono planning area and can certainly happen again. In addition to the natural climatic variability, human-induced changes in the atmosphere have the potential to alter future climatic conditions in the area.

Evidence of severe and persistent drought in pre-historic times has been found in the northern part of the planning area, indicating periods of 140 to 220 years with very little precipitation (Stine, 1994). Dozens of Jeffrey pine (*Pinus jeffreyi*) stumps are rooted in the main channel of the West Walker River upstream of Walker. These trees could survive in that location only if streamflow was so low that the roots of the trees were not submerged for more than a few weeks each year. Radiocarbon dating of the wood showed that an older group of trees was alive between about AD 900 and 1100 and another set of trees grew in the bottom of the channel between about AD 1210 and 1350 (Stine, 1994). The channel is narrow and stable enough that changes in the location of the channel cannot explain the presence of the stumps. The age of the trees in the West Walker River corresponds to the age of other old stumps found in Tenaya Lake and near Mono Lake, suggesting that dry conditions during the same periods allowed establishment of trees in other locations in the region (Stine, 1994). In modern times, the period of 1928 through 1934 is regarded as an extended drought within the Walker River basin.

Records of streamflow in the Owens Valley since the 1920s allow comparison of flood peaks over time. There appears to be a cluster of relatively extreme events in the 1970s and 1980s (Kattelmann, 1992). Five of the largest eight to eleven snowmelt floods (in terms of volume) occurred from 1978 to 1986. Five of the smallest thirteen or fourteen snowmelt floods occurred from 1987 to 1991. Instantaneous peak flows show similar clustering. For example, in Rock Creek, four of the ten largest annual floods and three of the six smallest annual floods happened in the 1980s. Such events support theories of some climatologists that because of an observed shift in hemispheric flow patterns, extreme events are becoming more common in North America.

As global temperatures continue to rise as a result of anthropogenic increases in atmospheric carbon dioxide, changes in the climate of the Sierra Nevada can be expected. A wide variety of reports issued in the past decade suggest regional temperatures will rise, precipitation will decline, there will be more rain and less snowfall, there will be a smaller snowpack, the snowpack will begin to melt earlier, and the snowpack will melt faster. However, the situation and the underlying physical processes are not quite so simple. For example, snowmelt in the Sierra Nevada has surprisingly little direct response to air temperature. Solar radiation input to the snow surface is a far more important factor in energy exchange (and therefore, snowmelt) than processes involving the temperature of the air. Water managers relying on the water resources of the planning area need to anticipate the possibility of changes in climate and hydrology compared to the recent past, but should not assume that the common predictions of less snow are the only reasonable scenario.

Under various global climate change scenarios, California is likely to see average annual temperatures rise by 4°F to 6°F in the next century, assuming actions are taken to reduce emissions of greenhouse gases. If no such changes are made, a “higher-emissions scenario” projects statewide temperature averages in California 7°F to 10.5°F higher. The range of figures comes from two models whose projections were summarized by the Union of Concerned Scientists in 2004. A theory suggests that high-elevation areas, such as the upper portions of the eastern Sierra Nevada, may warm more rapidly than regions as a whole.

The Department of Water Resources estimates that a 3ºF temperature increase could mean an 11 percent decrease in annual statewide water supply. Under the coolest climate change projections, there could be a loss of about 5 million acre-feet/year in snowpack water statewide. In the eastern Sierra Nevada, the snowpack would not be affected as much as in lower-elevation watersheds of the western slope because most of the heavy snowpack zone in the eastern Sierra Nevada watersheds is at higher elevations (above 8,500 feet) that would still receive mostly snow except under severe warming scenarios. There are also predictions of greater cloudiness in the Sierra Nevada under a warmer climate. However, clouds can either cool an area by blocking sunlight or keep it warm, functioning as a blanket in cold weather. There is uncertainty about how the effects of clouds might play out.

Under various scenarios, it is possible that the glaciers and permanent snowfields of the eastern Sierra Nevada will disappear by mid-century. For example, the Dana Glacier in the headwaters of Lee Vining Creek has already shrunk dramatically since the late 1800s.

Topography, geology, and soils

Topography

The geology and land-forms of the Inyo-Mono IRWM planning area are difficult to characterize because of the diversity of the region. One of the few consistent traits is that the entire region is within the Great Basin – all watersheds have internal drainage with no natural outlets to an ocean. Therefore, there is a sense of hydrologic isolation of each of the component watersheds. This region lacks the natural hydrologic connectivity of IRWM groups organized by river basin. Again, it is useful to separate the region into an eastern Sierra Nevada zone and a northern Mojave Desert zone.

The eastern Sierra Nevada zone spans the border between two major geologic provinces: the Sierra Nevada and the Basin and Range. The earth's crust in this region has been stretched apart, leaving a series of alternating mountain ranges and valleys. The mountain slopes tend to be quite steep with relatively little horizontal distance separating points differing in elevation by thousands of feet. The intervening valleys tend to be comparatively level and are composed mostly of materials eroded from the adjacent mountain slopes.

The crest of the Sierra Nevada is the western edge of the planning area and is largely above 10,000 feet in elevation. The crest includes much terrain above 12,000 feet and a few summits above 14,000 feet. The lowest parts of the crest (8,000 to 9,000 feet) are in the northwestern part of the West Walker River watershed, and the highest elevations are found west of Lone Pine and west of Big Pine. The steepest slopes in the region tend to be near the crest. At the extreme, small areas of the mountain front are vertical, and many areas along the mountains require technical climbing skills for travel. Slopes trend toward lower gradients with distance from the Sierra Nevada crest.

To the east of the Sierra Nevada are several broad valleys: (from north to south) Slinkard Valley (6,550 to 5,750 feet), Antelope Valley (5,600 to 5,000 feet), Bridgeport Valley (6,750 to 6,450 feet), Mono Valley and Mono Lake (6,700 to 6,380 feet), Long Valley (7,000 to 6,750 feet), Round Valley (4,900 to 4,400 feet), and Owens Valley (4,300 to 3,550 feet). There is a second group of intermontane valleys north of Owens Valley: Adobe, Benton, Hammil, and Chalfant.

To the east of the main valleys, the terrain rises in a series of north-south oriented mountain ranges, which are the westernmost ranges of the Basin and Range geologic province. The larger of these ranges include the Sweetwater Mountains, Bodie Hills, Glass Mountains, and White-Inyo Mountains. These ranges also have steep topography and rise to between 10,000 and 14,000 feet.
The northern Mojave Desert zone is also part of the Basin and Range geologic province with steep mountain slopes and broad valleys between the ranges. The principal valleys are Saline Valley, Eureka Valley, Death Valley, Rose Valley, Panamint Valley, and Indian Wells Valley. The eastern slope of the southern Sierra Nevada defines the western extent of this southern zone. Among the main mountain ranges in this part of the Inyo-Mono planning area are the southern portion of the White-Inyo Mountains, Panamint Range, Grapevine Mountains, Funeral Mountains, Argus Range, Black Mountains, Greenwater Range, Slate Mountains, Owlshead Mountains, and Lava Mountains. Telescope Peak in the Panamint Range is the high point at 11,049 feet. Less than 20 miles to the east from Telescope Peak is the lowest topographic point in the nation at Badwater, 279 feet below sea level.

Geology

The geology of each watershed influences many of the characteristics of water between its entry via precipitation and departure as streamflow or evaporation back into the atmosphere. There may also be a relatively small amount of water that leaves some watersheds as deep groundwater flow -- obviously influenced by geology as well. Some of the important influences of geology with respect to hydrologic processes include serving as the parent material for soils, which in turn control whether water remains on the surface or penetrates into the ground; storage and transport of water below the surface; chemical reactions and contributions of chemical substances to the water; potential for erosion and mass movement of soil and rocks; formation and control of stream channels; and substrate for vegetation, which removes much of the water stored in the soil.

Geology of the eastern Sierra Nevada zone is well described in a wide variety of sources (*e.g.,* Hill, 1975; Bailey, et al., 1976; Whitney, 1979; Lipshie, 1979 and 2001; Rinehart, 2003), and only a basic summary that relates to hydrology is included here. This zone occupies the junction of the Sierra Nevada and Basin and Range geologic provinces. The basic form of the main watersheds is a result of the uplift (and tilt to the west) of the Sierra Nevada relative to the valleys lying to the east of the range. The form of the upper Owens River watershed was further determined by the formation of the Long Valley caldera by a massive volcanic eruption about 760,000 years ago (Bailey, et al., 1976). Subsequent volcanic activity, earthquakes, erosion and deposition by glaciers, and stream channel processes have contributed to the present-day landscape. Glacial till from eight to twelve glacial advances covers much of the elevation zone between 6,500 and 8,000 feet near the main creeks from the Sierra Nevada.

A variety of rock types occupies the surface and the subsurface zones of the watersheds. Granitic rock of the Sierra Nevada batholith is exposed along the Sierra Nevada front in many places. Metamorphosed sedimentary and volcanic rocks are found on top of the granitic rock in places where erosion did not reach the granitic rock, such as Laurel, Convict, and McGee creeks. Volcanic rocks such as andesite, basalt, and the rhyolitic Bishop tuff (fused ash from the Long Valley caldera eruption with an average thickness of 500 feet [Gilbert, 1938]) are found above the older metamorphic and granitic rocks as well.

The northern Mojave Desert portion of the planning area is mostly composed of sedimentary and meta-sedimentary rock that formed from sediments deposited in shallow coastal waters and tidal flats. Volcanic activity and intrusive magma added basalts, rhyolites, and granitic rocks in localized areas. About 14 million years ago, the area started to be pulled apart by crustal movements, which resulted in a series of uplifted and tilted mountain ranges with valleys in between.

These various rock types have been further rearranged by the numerous faults in the area. The area beneath the town of Mammoth Lakes is particularly complex: interleaved layers of volcanic materials, glacial till, and stream deposits that are further stirred up by faulting. Volcanic processes have also formed many of the uplands throughout the eastern Sierra Nevada zone, such as the Bodie Hills, Anchorite Hills, Cowtrack Mountains, Glass Mountains, Mono Craters, Volcanic Tablelands, Crater Mountain, and Red Mountain.

The intermontane valleys initially formed as down-dropped fault blocks and subsequently filled with sediment transported from the adjacent mountain ranges. Sediment from glacial erosion, mass movements, surface processes, and channel erosion has filled the valleys to depths of hundreds of feet. The Owens Valley has some areas with up to 7,500 feet of alluvial fill. These sediment-filled depressions contain significant groundwater resources as water has filled the pore space between the sediment particles.

The magnitude 6 earthquake of May, 1980, in Long Valley prompted a great deal of local geological research in the past 30 years. Dozens of scientific papers have provided a detailed understanding of the geologic history, structure, and activity of the Long Valley caldera (a roughly elliptical volcanic-tectonic depression measuring 18 miles from east to west and 10 miles from north to south). Some of this work is quite relevant to understanding groundwater storage, movement, chemistry, and interactions with surface flows.

The volcanic activity also creates a geothermal energy resource that is directly tied in with the groundwater system. The heat source for various hot springs, fumaroles and hydrothermal alteration zones is presumed to originate from magma chambers at depths of a few thousand feet. Groundwater is warmed by heat rising from such areas and by water circulating from deep fractures. The presence of hot water at relatively shallow depths causes problems for municipal/domestic water production that seeks to avoid hot water with a high mineral content but provides the opportunity to extract heat for generation of electricity. The development of geothermal energy near the junction of U.S. Highway 395 and State Route 203 led to the creation of the Long Valley Hydrologic Advisory Committee, a technical group that monitors wells, springs, and streams down-gradient of the geothermal plant for signs of any changes that might be related to the geothermal development and/or overuse of water from Mammoth Creek in the town of Mammoth Lakes. Another large-scale geothermal generating facility is located at Coso, between Haiwee Reservoir and Little Lake.

Over geologic time, hot water circulation has contributed to concentrations of economically valuable minerals in many parts of the planning area. Prospecting for gold and silver occurred almost everywhere except in granitic rocks and lake sediments. Mines around Bodie were the most successful in the region. There were also substantial mining operations in Lundy Canyon, Mammoth Lakes, Onion Valley, Cerro Gordo, and Panamint City. Pine Creek, west of Bishop, was the location of one of the world’s largest tungsten mines for several decades.

During the Pleistocene geologic epoch (2.6 million to 12,000 years ago), the Inyo-Mono planning area had a much wetter climate and abundant runoff. The water formed a series of huge lakes that covered many of the intermontane valleys. Lake Russell filled the Mono Basin to a depth about 700 feet above the present Mono Lake. Water from Owens Lake overflowed to the south and formed Fossil Falls enroute to China Lake. The ancestral Amargosa River formed Lake Tecopa and filled much of Death Valley with Lake Manly. Panamint Lake and Searles Lake were also enormous bodies of water during the Pleistocene.

After the climate became much drier, the water evaporated and left vast mineral deposits behind on the lakebeds. Various salts, most importantly borax, were mined from these playa deposits during the late 1800s. Some operations, such as on the west shore of Owens Lake, continued until recent times.

Soils

Soils of the various watersheds throughout the planning area have formed from the underlying geologic parent material and consequently vary with the rock types as well as the localized moisture regime and weathering situation, biological influences, slope position and erosion potential, and time period for soil development. Most of the soils throughout the planning area tend to be shallow, coarse-textured, and poorly developed. The most common texture class is probably gravelly loam. Soils found on steeper soils tend to be shallow, loose, and unconsolidated, whereas soils found on relatively level areas in meadows and other alluvial deposits tend to be deeper, better developed, and less prone to erosion. Because many areas have very young parent materials, only a few hundred to a few thousand years in age, soils tend to be incompletely developed with minimal stratification.

Throughout the eastern Sierra Nevada zone, the soils at lower elevations are generally derived from granitic and volcanic parent material and are sandy loams and decomposed granite. Soil depth ranges from very shallow with lots of rocks to deep alluvium in the valleys (Thomas, 1984). At higher elevations, soil depths range from a few inches to 3 or 4 feet. Sandy loam is the most common texture, but rock content is commonly up to 35 percent, especially on steeper slopes. Water retention tends to be low and decreases when rock occupies a greater proportion of the volume (Thomas, 1984).

Soils on steeper mountain slopes are generally somewhat excessively to excessively drained, coarse-textured, and shallow. Soils that formed on the foothills are well to excessively drained, are shallow to moderately deep, and generally have coarse-textured surfaces with some having coarse- to fine- textured subsoils. Soils developed on the high terraces are well to moderately well drained on nearly level to sloping terrain. Soils developed on low terraces are somewhat poorly to poorly drained on nearly level terrain. Most terrace soils lie above a heavy textured subsoil with a variety of surface textures. Soils on alluvial fans include well to excessively drained soils except where groundwater is present (Mono County Resource Conservation District, 1990).

Soils on floodplains are generally loamy and sandy in texture, and are deep to moderately deep with coarse-textured subsoils. Drainage is somewhat poor to very poor, and soils are eroded by past and present channels of the rivers. Soils formed in topographic depressions are generally clayey throughout and have high organic matter content. These soils also exhibit poor drainage conditions (Mono County Resource Conservation District, 1990). Nevertheless, soils on the valley flats are the best developed and most productive soils in the region. Such soils have allowed reasonably productive agriculture in the Antelope Valley, Bridgeport Valley, and Owens Valley for more than a century.

Within the once-proposed Sherwin Ski Area, which is somewhat representative of portions of the eastern slope of the Sierra Nevada, soils were limited to topographic benches, isolated pockets, and lower-angle swales (Inyo National Forest, 1988). On these low-angle portions of the terrain, soils up to 2 feet thick were noted, and organic layers of several inches depth were found in pocket meadows. Water holding capacity was generally less than 4 inches. Where thin soils were present on steeper slopes, they tended to be highly erodible, especially if disturbed (Inyo National Forest, 1988).

In the valleys once occupied by Pleistocene Lakes, as the water level dropped, salts accumulated in the more recent sediments, particularly on the gently sloping gradients. Soils derived from these sediments tend to have high salt content. In addition, salts and alkali affect many areas of poorly and very poorly drained soils on the floodplains, basins and low terraces (Mono County Resource Conservation District, 1990).

The greatest potential for soil erosion occurs with sandy soils on steep slopes where water may flow over the surface and entrain soil particles. Areas where vegetation has been removed and soils mechanically compacted (*e.g,* roads, trails, construction sites, off-road vehicle routes) are much more subject to erosion than undisturbed areas. Wind erosion of exposed soils can be significant during high-wind events.

Upland and riparian vegetation

Upland vegetation

Distribution and type of vegetation throughout the Inyo-Mono IRWM planning area are dependent on soils, moisture availability, air and soil temperature, and sunlight. Different vegetation communities tend to be associated with elevation zones because of the combination of environmental factors favoring different plants species. Slope aspect can also play a major role in plant distribution with greater moisture stress on south-facing slopes than on shaded north-facing slopes. The declining gradient in precipitation from west to east results in a rapid transition in vegetation -- from conifer forests in the Sierra Nevada to open woodlands in the hills to sagebrush scrub in the valleys just east of the Sierra Nevada (California Department of Water Resources, 1992). In the northern Mojave

Desert zone, water availability also controls the composition and distribution of plant communities. Although trees can survive at elevations above 6,000 feet if sufficient moisture is available, most of the northern Mojave Desert zone is dominated by drought-tolerant shrubs.

At the Sierra Nevada crest on the western margin of the planning area, vegetation cover is sparse with the most wind-exposed locations nearly barren. In more protected locations, grasses, forbs, dwarf shrubs, and even a few whitebark pine (*Pinus albicaulis*) can be found. Moving downslope, the numbers of species and individual plants increase. In addition to the whitebark pine, mountain hemlock (*Tsuga mertensiana*) and western white pine (*Pinus monticola*) account for the tree species in the subalpine zone, which extends down to about 9,000 feet in the eastern Sierra Nevada watersheds. These trees merge into the red fir (*Abies magnifica*)-lodgepole pine (*Pinus contorta* ssp. *murrayana*) forest. The density of trees and the litter layer of accumulated needles are much greater here than among the scattered subalpine trees. The red fir - lodgepole pine forest merges into the Jeffrey pine (*Pinus jeffreyi*) forest at about 7,500 to 8,000 feet. Some white fir (*Abies concolor*) can be found among the Jeffrey pines. Western juniper (*Juniperus occidentalis* var. *occidentalis*) are also scattered in the east-side forests. Aspen (*Populus tremuloides*) clones are found where soil moisture is high and along creeks (USDA-Forest Service, 2004).

As in most other parts of the Sierra Nevada, decades of successful fire suppression have markedly changed the composition and density of the mixed conifer forest of the eastern Sierra Nevada. Dense stands of white fir and Jeffrey pine have taken over the former open stands of large Jeffrey pine that were maintained by relatively frequent low-intensity fires (Lucich, 2004). Conifers have also entered former aspen groves and reduced regeneration of aspen (Lucich, 2004).

At upper elevations in the eastern Sierra Nevada zone, brushfields are comprised of buckbrush (*Ceanothus velutinus*) and chokecherry (*Prunus emarginatus*). At lower elevations, the brush community is mostly sage (*Artemesia tridentata*), bitterbrush (*Purshia tridentata*), mountain mahogany (*Cercocarpus ledifolius*) and snowberry (*Symphoricarpus albus*) (USDA-Forest Service, 1988).

The lower slopes of the Sierra Nevada (below 6,000 feet) are largely covered by a sagebrush (*Artemisia tridentata*) community, intermingled with meadows and some curlleaf mountain mahogany (*Cercocarpus ledifolius*). Typical species of the sagebrush community include bitterbrush (*Purshia tridentata*), rabbitbrush (*Chrysothamnus* spp.), wheatgrass (*Agropyron* spp.), bluegrass (*Poa* spp.), wild-rye (*Elymus glaucus*), needle-grass (*Stipa* spp.), and June grass (*Koelaria cristata*) (Thomas, 1984).

In the eastern ranges of the northern portion of the planning area, the main plant community is pinyon-juniper (*Pinus monophylla*, *Juniperus scopulorum*) woodland. Bitterbrush and sagebrush dominate the forest understory. The grass composition is similar to that of the lower-elevation Sierra Nevada front to the west (Thomas, 1984).

The vegetation at the lower elevations of the West Walker River basin (5,000 to 7,000 feet) has changed substantially since the 1860s from bunchgrass range to bitterbrush and sagebrush (*e.g.,* Thomas, 1984). Prior to the arrival of Euroamericans in the mid-19th century, portions of the West Walker River basin below and between the coniferous forest stands were primarily habitat for pronghorn and desert bighorn sheep. As overgrazing by thousands of domestic sheep during the late 1800s and early 1900s removed the bunchgrass, brush species became established. Consequently, the bighorn sheep and pronghorn left the area, and mule deer moved in, taking advantage of the browse species (Thomas, 1984). The native grasses, sedges, and rushes of the meadows were also converted to alfalfa and other forage species.

Plant communities of the northern Mojave Desert zone are completely different than those of the eastern Sierra Nevada zone because of the severely limited availability of water in the desert. Only plants able to survive high temperatures, low humidity, and little soil water are found in the northern Mojave Desert zone. The upper portions of the desert ranges receive several times more precipitation than the surrounding lowlands and are able to support pinyon-juniper woodlands above 6,000 to 7,000 feet (Tweed and Davis, 2003). Limber pine (*Pinus flexilis*) and bristlecone pine (*Pinus longaeva*) grow above 9,000 feet in the southern part of the White-Inyo Mountains and Panamint Mountains. Joshua trees (*Yucca brevifolia*) occur below the pinyon-juniper woodlands at about 4,000 to 6,000 feet (Ingram, 2008). At successively lower elevations and correspondingly drier sites, a wide variety of drought-tolerant shrubs are found. Common plants include sagebrush (*Artemisia tridentata*), rabbitbrush (*Chysothamnus nauseosus*), burrobush (*Ambrosia dumosa*), brittlebush (*Encelia farinosa*), creosote bush (*Larrea tridentata*), and mesquite (*Prosopis* spp.) (Tweed and Davis, 2003). Several cactus species (about 14) grow in the northern Mojave Desert zone and are well adapted to the arid conditions (Ingram, 2008). They tend to be more abundant in the eastern portion that has greater summer rainfall (Rowlands, 1995).

Riparian areas and wetlands

Riparian zones are the areas bordering streams, springs, and lakes that provide a transition from aquatic to terrestrial environments. In arid regions, such as the Inyo-Mono IRWM planning area, riparian areas and the water body they surround are the most ecologically important portions of a watershed. The presence of water allows much life to thrive close to the stream course that would otherwise not exist. As streams rise and fall, the lower parts of the riparian corridor may be inundated for days to weeks. Soil moisture is much higher within the riparian zone than farther up slope and is often saturated close to the stream. Plants within riparian corridors are adapted to the high soil moisture and occasional submergence. Depending on the nature of the soils, topography, and the stream, the riparian zone may be narrow or wide and have an abrupt or gradual transition to upland vegetation (Swanson, et al., 1982; Gregory, et al., 1991; Kattelmann and Embury, 1996).

Riparian areas are considered to be among the most ecologically valuable natural communities because they provide significantly greater water, food resources, habitat, and favorable microclimates than other parts of the landscape. The extra water alone leads to greater plant growth and diversity of species in riparian areas compared to other areas. The enhanced plant productivity, greater species richness, availability of water and prey, and cooler summer temperatures of riparian areas draws wildlife in greater numbers than in drier areas. Below the forest margin in the eastern Sierra Nevada, riparian areas are a dramatic change from the surrounding sagebrush scrub. In arid lands, streams, springs, and riparian zones are especially critical.

Streams and their adjacent riparian lands allow for the transport of water, sediment, food resources, seeds, and organic matter (Vannote, et al., 1980). Riparian corridors act as "highways" for plants and animals between natural communities that are stratified with elevation. The continuity of riparian corridors is one of their most important attributes. If the upstream-downstream connection is interrupted by a dam, road, or other development, the ecological value of the riparian system is greatly diminished.

In watersheds of the eastern Sierra Nevada, riparian corridors along the major creeks cross through several upland vegetation communities in just a few miles because of the steep topography. In the headwater areas, typical riparian vegetation includes lodgepole pine (*Pinus contorta* spp. *murrayana*), aspen (*Populus tremuloides*), mountain alder (*Alnus incana* spp. *tenuifolia*), currant (*Ribes* sp.), and willow (*Salix* sp.). Jeffrey pine (*Pinus jeffreyi*), black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), and wild rose (*Rosa woodsii*) are present in some of the mid-elevation canyons. At elevations between the glacial moraines and the valley floor, water birch (*Betula occidentalis*), Fremont cottonwood (*Populus fremontii*), and other species of willow add to the mix (Howald, 2000a and 2000b).

Along the streams of the eastern Sierra Nevada, riparian environments offer critical resources for a large, though unknown, fraction of insect and other animal species. For some, the riparian zone is primary habitat. For other species, the riparian resources of water, food, higher humidity and cooler summer temperatures, shade, and cover are used on occasion. Insects are more abundant near streams and are an important food for fish, amphibians, birds, and mammals. Open water and moist soils are both critical for amphibians. Almost all species of salamanders, frogs, and toads native to the Sierra Nevada spend much of their life cycles in riparian zones (Jennings, 1996). Birds tend to be far more numerous and diverse in riparian zones than in drier parts of the watershed. Most mammals at least visit riparian areas occasionally to take advantage of resources that are less available elsewhere in the watershed. The mammal most obviously dependent on the riparian zone is the beaver.

Riparian areas are fundamentally limited to the margins of streams, springs, creeks, and lakes. With their restricted width (generally tens of feet on either side of a stream, wider along flatter portions of the principal streams), riparian areas occupy very a small portion of the landscape. An evaluation of proposed hydroelectric projects in the eastern Sierra Nevada considered riparian zones to cover less than one percent of the surface area of their watersheds (Federal Energy Regulatory Commission, 1986).

Most of the riparian corridors at the higher-elevation portions of the Humboldt-Toiyabe and Inyo National Forests are relatively undisturbed (except by historic grazing), but many of the riparian areas in lower valleys have been changed by road construction, overgrazing, groundwater pumping, water exports, and recreation. Some of the principal paved roads of the region follow streams for many miles and are often within the riparian zone. Forest roads are within the riparian zone in hundreds of places within the two National Forests of the eastern Sierra Nevada.

Although very important in their limited extent where they exist, there are few riparian areas within the northern Mojave Desert zone. Most are very short segments along channels downslope from springs and seeps that may only be tens to hundreds of feet in length. The Amargosa River canyon south of Tecopa is the best example of an extensive riparian area in the northern Mojave Desert zone. Due to the presence of cooler and wetter conditions and better soil, many washes support greater plant and animal diversity and productivity than the surrounding uplands, and the BLM has begun closing roads in washes in order to protect these biological resources.

Wetlands are areas that are flooded with water for enough of each year to determine how the soil develops and what types of plants and animals can live in that area. They are often called marshes, swamps, or bogs. The critical factor is that the soil is saturated with water for at least a portion of the year. This saturation of the soil leads to the development of particular soil types and favors plants that are adapted to soils lacking air in the pores for a portion of the year. The federal Clean Water Act defines the term wetlands as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

General acceptance of the ecological values of wetlands has occurred relatively recently (National Research Council, 1995). Drainage and deliberate destruction of wetlands were widely accepted practices until the mid-1970s. California has lost a greater fraction of its wetlands than any other state. Only about 9 percent of the original wetlands (454,000 acres out of about 5 million acres) remain in California (National Research Council, 1992). The recognition of the importance of the small fraction remaining has led to a variety of regulatory efforts to minimize the further loss of wetlands. The relatively recent concept of wetlands as valuable to nature and the public at large has generated conflicts with individuals who own wetlands and do not see any personal benefit.

The largest areas of wetlands in the region are flood-irrigated lands in Antelope Valley, Little Antelope Valley, Bridgeport Valley, and Long Valley. Most of these areas would not be classified as wetlands without the artificial application of water for more than a century. Wetlands in much of Mono County have been inventoried and described in a project of the Lahontan Regional Water Quality Control Board and U.C. Santa Cruz in the 1990s (e.g., Curry, 1996).

The primary loss of wetlands in the upper Owens River watershed occurred with the filling of the Long Valley dam in 1940. A natural dam at the top of the Owens Gorge, caused by the relative rise of the Volcanic Tableland fault block (Lee, 1906), led to the low gradient of the Owens River through Long Valley and consequent conditions that favored wetlands along the river channel (Smeltzer and Kondolf, 1999). USGS topographic maps made circa 1913 during the studies by Charles H. Lee show more than 4,000 acres of wetlands within Long Valley (Smeltzer and Kondolf, 1999, esp. figure 20).

Within Inyo County, the primary wetlands are found along the lower Owens River. Within the northern Mojave Desert zone, locally important wetlands include: Grimshaw Lake near Tecopa, Saratoga Springs in southern Death Valley, Saline Valley marshlands at foot of Inyo Mountains, Salt Creek and Cottonball Marsh north of Furnace Creek, and Warm Sulphur Springs at Ballarat in Panamint Valley.

Invasive Weeds

The term weed is typically used to describe any plant that is unwanted and grows and spreads aggressively. The term noxious weed describes an invasive unwanted non-native plant and refers to weeds that can infest large areas or cause economic and ecological damage to an area (USDA-Forest Service, 2004). At higher elevations, several invasive weeds have been identified, but a detailed description is beyond the scope of this plan.

At lower elevations, invasive plants are even more aggressive and have caused widespread problems. Tamarisk or salt cedar (*Tamarix* spp.) has invaded riparian zones below about 7,000 feet. It readily crowds out most beneficial riparian shrubs and trees and uses large amounts of water because of its ability to establish deep roots that extend below the water table adjacent to streams. In the Mono Basin, tamarisk is established at levels currently under control (due to an interagency effort) along the lower reaches of Rush and Lee Vining Creeks. Tamarisk has become well established along the lower Owens River and is being treated by the Inyo Water Department and Los Angeles Department of Water and Power. In the northern Mojave Desert zone, tamarisk removes much of the scarce water from springs and ephemeral stream channels that would otherwise benefit many plants and animals. Other invasive plants, such as woolly mullein (*Verbascum thapsus*), Russian thistle (*Salsola* sp.), cheatgrass (*Bromus tectorum*), Russian olive (*Elaeagnus angustifolia*), and perennial pepperweed (*Lepidium latifolium*) also have serious implications for terrestrial and aquatic ecosystems. Several other problematic species are targeted by property owners, agencies, and a group formed to combat invasive weeds.

Most of the eastern Sierra Nevada zone of the Inyo-Mono IRWM planning area is covered by the Eastern Sierra Weed Management Area, a consortium of land management agencies and other entities formed in 1998. The mission of this group is the control and eradication of noxious weeds through integrated management activities. Members of the group include Inyo/Mono Counties' Agricultural Commissioner's Office, Inyo County Water Department, California Department of Food and Agriculture, Los Angeles Department of Water and Power, Bureau of Land Management Bishop Field Office, Bureau of Land Management Desert District, Inyo National Forest, Humboldt-Toiyabe National Forest, Inyo/Mono Resource Conservation District, Inyo/Mono Counties' Cattleman's Association, Natural Resources Conservation Service, California Department of Forestry and Fire Protection, California Department of Transportation District 9, Bishop Paiute Tribe Environmental Office, and California Department of Parks and Recreation.

Role of wildfire

Wildfires are a major watershed management issue as well as natural hazard within the eastern Sierra Nevada zone of the Inyo-Mono IRWM planning area. Wildfires are not much of a concern (except in localized areas and under unusual conditions) within the northern Mojave Desert zone because of the sparse vegetation.

Fire is a natural disturbance feature of the landscape. Prior to the 20th century, the primary cause of fire was lightning, coinciding with summer thunderstorms. When ignited at higher elevations, the fires were typically not large. Lower elevations experience fewer lightning ignitions, but the shrublands have the potential to burn more extensively, and have in the past. Fire suppression policies were instituted in the early days of the National Forest System. With the near absence of wildfire in the past century, fuel loads in forest and shrublands far exceed natural levels. Therefore, modern fires are likely to be both intense and extensive.

Analyses of tree stumps and cores have suggested that pre-1900 intervals between wildfires were highly variable in the upper Owens River watershed. Before active fire suppression, fires occurred in the Jeffrey pine and mixed conifer stands about every 10 to 20 years on the average, and in red fir stands about every 30 years on the average (Millar, et al., 1996). Wildfires appear to have been low intensity in both pine and fir forests; however, the structure of some red fir stands indicates that stand-replacing fires occurred. The studies of fire history show that the size, frequency, and distribution of fires changed markedly with the beginning of suppression (Millar, et al., 1996).

In the high-elevation subalpine zone, wildfires are uncommon, infrequent, and usually limited to only a few trees. No large historic fires have been documented at elevations over 8,000 feet in the eastern Sierra Nevada zone. Fires intensities tend to be low, and large fires rarely develop. The subalpine zone tends to be cooler and wetter than areas at lower elevation. Forest structure is probably the closest to reference conditions in the subalpine zone. Most of the late successional forest stands are found at these higher elevations (USDA-Forest Service, 2004).

Fish and wildlife

Fish, particularly trout, are a highly valued recreational resource of the streams of the eastern Sierra Nevada. Much of the tourism economy of the area is dependent on fishing. The streams and lakes of the region have hundreds of thousands of angler-days of use each season. Introduced in the late 1800s, trout have become thoroughly integrated into the aquatic ecology of eastern Sierra Nevada watersheds, often at the expense of amphibians. The extent and numbers of non-native trout increased dramatically when aerial stocking of trout became widespread in the 1950s. Before the artificial stocking, most waters in the eastern Sierra Nevada did not contain trout, except for a few creeks that contained native Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) (Milliron, et al., 2004). Many strains of rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*), and brook trout (*Salvelinus fontinalis*) have been planted in lakes and tributaries of the main rivers, and many of these trout have successfully spawned, producing “wild trout” progeny. The term “wild trout” is distinct from “native trout,” which refers to trout that existed in streams prior to European settlement and have a defined natural range without human intervention (Milliron, et al., 2004).

The Lahontan cutthroat trout (*Oncorhyncus clarki henshawi*) is the prominent species of native fish in the Walker River basin. The original range of the Lahontan cutthroat trout has been reduced more than 90 percent by changes in streamflows and channel conditions and overfishing (Knapp, 1996). Predation by, competition with, and hybridization with introduced trout have also greatly impacted the remaining groups of these fish (Gerstung, 1988). As the once huge population in Walker Lake has declined drastically with increasing salinity, efforts have begun to ensure survival of the species in streams of the upper watershed. When only a few isolated populations could be found, the Lahontan cutthroat trout was listed as endangered under the Endangered Species Act in 1970 and then reclassified as threatened in 1975. The fragmentation of habitat leading to the isolation of small groups of fish is a primary concern.

Native fishes of the Long Valley streams include Owens sucker (*Catostomus fumeiventris*), Owens tui chub (*Gila bicolor snyderi*), toikona tui chub, and speckled dace (*Rhynichthys osculus*) (Hubbs and Miller, 1948; Miller, 1973, Chen et al., 2007). The U.S. Fish and Wildlife Service (1998) recommended four “Conservation Areas” within Long Valley to help with recovery of Owens tui chub and Long Valley speckled dace: Little Hot Creek, Whitmore, Little Alkali, and Hot Creek. Within the Owens Valley, the Owens pupfish (*Cyprinodon radiosus*) was the primary native fish. However, the species was reduced to just two locations by 1934 and was thought to be extinct by 1948 (Pister, 1995). After a small population of surviving Owens pupfish was found in 1956, the California Department of Fish and Game, Los Angeles Department of Water and Power, and Bureau of Land Management cooperated in creating refuges for the species in the Fish Slough area north of Bishop.

Fish introductions to the Owens River basin began in the late 1800s with Lahontan cutthroat trout from the Walker River and golden trout from the Kern River. Rainbow, brown, and eastern brook trout from hatcheries in other parts of California were first introduced in about 1900 (Pister, 1995). The Mount Whitney State Fish Hatchery, built in 1917, lead to significant fish rearing and stocking programs in waters of the eastern Sierra Nevada.

The upper Owens River through lower Long Valley before the reservoir started filling in 1941 was regarded as a "superb stream fishery" (Pister, 1982). The subsequent lake is also a highly productive fishery. The growth rates of rainbow trout and brown trout in Crowley Lake are among the highest ever recorded for a resident trout population in a mountain environment (Von Geldren, 1989). Crowley Lake's high productivity results in trout that gain from three to 40 times their stocked weight before harvest (Milliron, 1997).

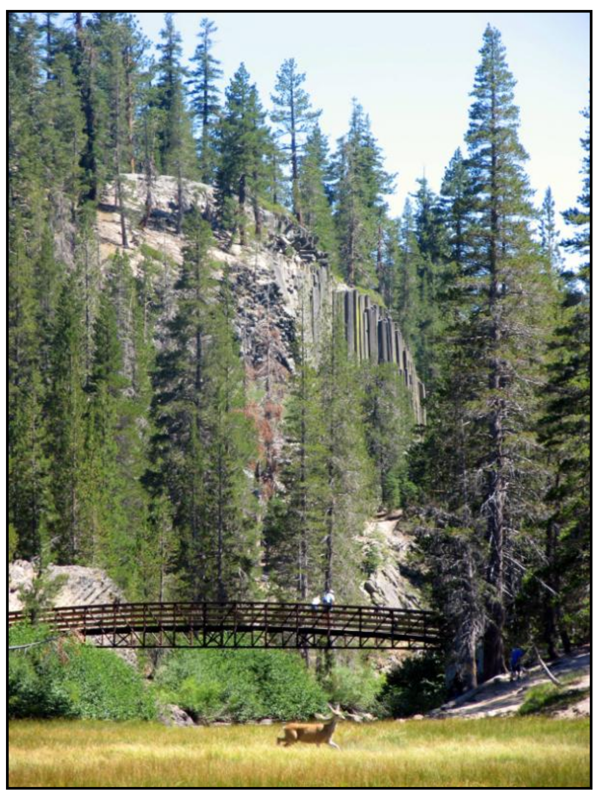
In the northern Mojave Desert zone, there are a few isolated populations of pupfish that have remained after Lake Manly dried up. Four species and ten subspecies of pupfish are found in streams, springs, and wetlands of the northern Mojave (Tweed and Davis, 2003). Within California, these fish are located in the Amargosa River, Saratoga Springs, Salt Creek, and Cottonball Marsh.

Amphibians are assumed to be scattered throughout the Sierra Nevada watersheds, but have been depleted by introduced trout (e.g., Knapp and Matthews, 2000). The larger populations are found in waters without fish. Amphibian populations are also assumed to be declining in the eastern Sierra Nevada as is the case in most of the Sierra Nevada (e.g., Jennings, 1996). In past decades, anecdotal accounts suggested that frogs and toads were very common, abundant, and widespread. During the 1980s, biologists began to note that amphibians were becoming relatively uncommon and detected diseases and deformities that have not been noticed or at least widely described in the past. A recently identified disease, chytridiomycosis,caused by a fungal pathogen, appears to spreading at an alarming rate and greatly reducing population size (Rachowitz, et al., 2006). The principal amphibians of the eastern Sierra Nevada watersheds are Yosemite toad (*Bufo canorus*), mountain yellow-legged frog (*Rana muscosa*), and Pacific tree frog (*Hyla regilla*). Salamanders--including the poorly described Kern Plateau slender salamander (*Batrachoseps robustus,* imperiled) and a southern species of web-toed salamander (*Hydomantes platycephalus)*--are present in some areas as well. The Humboldt-Toiyabe National Forest has established several "critical aquatic refuges" to promote recovery of threatened amphibians. The Kirkwood Lake refuge was established for the mountain yellow-legged frog. It covers 840 acres at the higher elevations of the West Walker River watershed. Surveys in 2000 found a total population of more than 10,000 frogs, among the heaviest concentrations in the Sierra Nevada. In addition to these frogs, Yosemite toad larvae were also found in this refuge in the 2000 survey. The Koenig Lake refuge was established for Yosemite toads. It includes 2000 acres in the Latopie, Koenig and Leavitt lakes subwatersheds. Recent surveys found Yosemite toad tadpoles in the wetlands surrounding Koenig Lake and in unmapped ponds between Koenig and Latopie lakes (USDA-Forest Service, 2004). At the lower elevations surrounding Mono Lake, Great Basin spadefoot toads are common.

A few species of amphibians and reptiles eke out an existence at isolated springs and seeps in more arid reaches of the project area. These include the Panamint alligator lizard (*Elgaria panamintina*, threatened and in decline), the black toad (*Bufo exsul*, threatened but apparently stable), the Inyo slender salamander (*Batrachoseps campi*, a California species of special concern), the Great Basin spadefoot toad (*Spea intermontana*), the red-spotted toad (*Bufo punctatus*), and the western toad (*Bufo boreas*).

Terrestrial wildlife

In a watershed context, the animals that have the greatest impact on watershed processes are those largely unseen and unappreciated creatures that live below the soil surface and perform an immense amount of work in the soil. The activities of burrowing mammals, reptiles, insects, worms, and amphibians process organic matter and alter the physical structure of the upper part of the soil. Animals in the soil can have a huge effect on the pore space and structure of the soil and, consequently, on the infiltration capacity and water storage capacity of the soil. Human activities that impact soil organisms, such as excavation, compaction, vegetation removal, and



pollution, can have secondary impacts on the water relations of the soil.

Animals that are traditionally considered as "wildlife" are primarily of interest in the watershed context with respect to riparian habitat. The eastern Sierra Nevada does not have any wildlife species with either the behavior (*e.g.,* bison) or numbers (*e.g.*, elk in Rocky Mountain National Park) to make substantial changes in soil properties, vegetation, or stream conditions to alter hydrologic response of the watershed. Nevertheless, all native species have ecological roles, and one could imagine some hydrologic consequences if the population of some species were drastically changed. Fish and wildlife habitat of the upper elevations of the Inyo-Mono IRWM planning area tends to be in excellent condition while the lower portion, below about 7,000 feet elevation, tends to be in less satisfactory condition (Inyo National Forest, 1980).

Most wildlife species are dependent on the riparian zone, at least occasionally, for water, food, or shelter. Changes in riparian vegetation composition, density, and continuity can have serious impacts on wildlife. In most of the Inyo-Mono IRWM planning area, the stream corridors are critically important because of the lack of water elsewhere in the landscape. Wildlife dependent on the creek water and riparian habitat include mule deer (*Odocoileus hemionus*), white-tailed jackrabbits (*Lepus townsendii*), Nuttall's cottontail (*Sylvilagus nuttallii)*, montane vole (*Microtus montanus*), mink (*Mustela vison*), Yosemite toad, and mountain yellow-legged frog. Many birds also use eastern Sierra Nevada riparian habitat, including mourning dove (*Zenaida macroura*), Sooty grouse (*Dendragapus fuliginosus*), band-tailed pigeon (*Columba fasciata*), red-winged blackbird (*Agelaius phoeniceus*), song sparrow (*Melospiza melodia*), northern goshawk (*Accipiter gentilis*), osprey (*Pandion haliaetus*), and red-tailed hawk (*Buteo jamicensus)*. Kestrels (*Falco sparverius*), ravens (*Corvus corax*), goshawks (*Accipter gentilis*), red-tailed hawks (*Buteo jamaicensis*), prairie falcons (*Falco mexicanus*), and golden eagles (*Aquila chrysaetos*) also utilize riparian zones as part of their habitat.

Of the several wildlife species that use eastern Sierra Nevada riparian habitats for foraging, nesting, or cover, some are threatened or endangered or are of special concern. These species include the willow flycatcher (*Empidonax traillii*), sage grouse (*Centrocercus urophasianus*), peregrine falcon (*Falco peregrinus*), bald eagle (*Haliaeetus leucocephalus*), osprey (*Pandion haliaetus*), yellow warbler (*Dendronica petechia*), mountain beaver (*Aplodontia rufa*), and Inyo shrew (*Sorex tenellus*) (USDA Forest Service, 1989; California Department of Fish and Game, 1990). Long-distance migrant birds depend on riparian habitats as they travel through the arid Great Basin.

One species with direct hydrologic impacts is the beaver (*Castor canadensis*), with their dam-building behavior. Beaver were not known to exist in the Owens and Long valleys when EuroAmericans began settling the area (Hall, 1947). After World War II, there was a debate within the California Department of Fish and Game about the benefits and risks of introducing beaver. Within the West Walker River watershed, beaver were present along several streams in 1967: Little Walker River, West Walker River, Mill Creek, and Lost Cannon Creek (memo in CDFG files in Bishop office, no date). Beaver were introduced along Mill Creek in the Mono Basin by the Department of Fish and Game in the 1950s. The population thrives above

Lundy Reservoir for nearly the entire length of upper Lundy Canyon and in recent years has been spreading to nearby creeks, including Wilson Creek, DeChambeau Creek, and Lee Vining Creek.

Mule deer (*Odocoileus hemionus*) are the most prominent big game species of the eastern Sierra Nevada. The West Walker deer herd is a significant wildlife resource within the basin and affects many land management decisions. The Round Valley deer herd is of similar importance between Bishop and Mammoth Lakes.

Human history, land use, ownership, demographics, economy

Human history

Pre-history

Native Americans of the Piute and Washoe tribes lived in the Walker River basin for at least several hundred years. The tribes established settlements in valley bottoms along rivers and lakes. Smaller temporary settlements and campsites were occupied at higher elevations during warmer months and while on food gathering and trading forays. The Miwok from west central California also used the Sonora Pass area (USDA-Forest Service, 2004).

The North Mono Basin is the ancestral home to the Mono Lake Piute (or Kuzedika Piute) Indians and has been occupied continuously for the last 10,000 years. The population and geographical distribution of the native people of the Mono Basin is not known, but they survived upon the natural resources of the basin and traded surpluses with people to the west. After EuroAmericans arrived in the 1860s, logging deprived the Kudezika Piute of pine nuts from pinyon pines and caterpillars from Jeffrey pines; sheep grazing damaged the meadows that were the source of seeds, roots, and bulbs; and hunting reduced the pronghorn, bighorn sheep, and sage grouse (Gaines, 1989).

The upper Owens River watershed was probably mostly occupied in the summer months by the Piute people who could find more favorable year-round conditions in the Owens Valley or to the east. The persistent snowpack and low temperatures were likely to keep Native Americans out of the area during winter and early spring. However, there is some evidence for year-round occupancy of Long Valley, at least in the 1800s (Burton and Farrell, 1992). Presumably, there were good hunting opportunities in the watershed during the snow-free part of the year, and people from adjoining areas lived at the higher elevations during the summer. The Glass Mountains and Obsidian Dome provided high-quality obsidian for projectile points and tools. Volcanism, including ash falls as recently as 660 and 1,210 years ago (Wood, 1977), may have affected the vegetation, wildlife, and water of the upper Owens River watershed enough to limit Native American use of the area for periods of time (Hall, 1984).

Piute people had villages near Owens Lake and presumably farther north in the Owens Valley for centuries. There is evidence of dams and irrigation canals on Bishop and Big Pine Creeks dating back about 1,000 years. At least two square miles of bottomlands were irrigated by these canals to enhance the growth of native vegetation (Steward, 1934; Lawton, et al., 1976).

In the northern Mojave desert zone, semi-nomadic people had camps near the receding Lake Manly for at least 10,000 years (Tweed and Davis, 2003). There is little archaeological evidence of habitation between 7,500 and 4,500 years ago when the region dried out. After the climate moderated somewhat about 4,500 years ago, the archaeological record indicates occupation of the area resumed. The Kawaiisu people lived in the Indian Wells and Panamint valleys and the foothills of the southeastern Sierra Nevada. Southern Piutes lived in the vicinity of present-day Tecopa, and Western Shoshone lived in the most arid parts of the area, such as Saline and Death valleys. Villages near water sources were estimated to be occupied by about 50 to 60 people and total population of the northern Mojave desert region was probably less than 1,000 people (Tweed and Davis, 2003).

1820-1855

Trappers including Jedediah Smith and Joseph Walker apparently crossed within the lower Walker River basin in 1827 and 1833. The first Euro-Americans known to have visited the West Walker River basin were in the Bartelson-Bidwell party, who were the first overland emigrants to California. This group came through Antelope Valley in October 1841 and struggled over the Sierra Nevada somewhere north of Sonora Pass. The earliest exploration of the upper Owens River watershed by Euro-Americans is uncertain. Leroy Vining began prospecting in the Mono Basin in 1852 or 1853.

In 1834, Joseph Walker descended into Indian Wells Valley from Walker Pass and may have entered the southern portion of Owens Valley. He was back in 1843, passing Owens Lake with a party of 50 emigrants before ascending Walker Pass (Tweed and Davis, 2003). John C. Fremont traveled through the Owens Valley in October of 1845 and named the lake, river, and valley for one of his guides, Richard Owens, who was not present during that part of the expedition (Chalfant, 1933).

Traveling west from the vicinity of present-day Las Vegas, a party led by Antonio Armijo followed part of the Amargosa River and passed through the southern end of Death Valley during the winter of 1829-30 (Tweed and Davis, 2003). This route later became known as the "Spanish Trail". In the autumn and winter of 1849, several parties of emigrants ventured into Death Valley and experienced great hardships. Not all members survived – leading to the eventual name of the valley.

1855-1900

Antelope Valley was settled in the late 1850s and began to produce hay for Carson City and Virginia City (Mono County Resource Conservation District, 1990). Irrigation ditches were soon constructed to expand the land under cultivation. In addition to hay fields and pastures, farmers in the valley grew beans, melons, corn, tomatoes, and berries and started orchards that produced apples, peaches, and plums.

Settlers moved into the Owens Valley during the 1850s. During the winter of 1861-62, the greatest floods of the historical period were observed throughout the Sierra Nevada. Although the upper Owens River watershed was probably unoccupied at the time, persistent rainfall intermixed with snow led to extreme flows in the streams entering the Owens Valley. At the peak of the floods, the Owens River was estimated to be one-fourth to one-half mile wide. The harsh winter and inundation of the Owens Valley led to violent conflicts over food between Piutes and early white settlers (Chalfant, 1933).

Although gold was discovered near Bodie in 1859 and in Aurora in 1861, these mining areas did not take off until the late 1860s and early 1870s. The mining booms drew lots of travelers through the West Walker River and East Walker River watersheds and produced heavy demand for agricultural products from the rapidly growing farms of the Antelope and Bridgeport Valleys. N.B. Hunewill established a sawmill in Buckeye Canyon to supply lumber for Bodie. Sheep herding expanded in the uplands in response to the demand from the mining towns, and continued in large numbers into the early 1900s.

In the Mono Basin, prospecting led to towns in Lundy Canyon, upper Lee Vining Creek, and Rattlesnake Gulch. Farms and ranches in the basin supplied food to these gold-mining communities. Irrigation ditches were developed at that time to bring water from creeks to pastures and farm fields. LeRoy Vining operated a sawmill in Lee Vining canyon in the 1860s.

A group of prospectors continuing the search for the "Lost Cement Mine" in 1877 found a rich gold-silver vein in "Mineral Hill" or "Red Mountain" just east of Lake Mary (DeDecker, 1966). They called it the "Mammoth Vein" and organized the Lake mining district. Word of the new strike spread quickly, and miners rushed to the area. Mining camps were built nearby, including Mammoth City, Pine City, Mill City, and Mineral Park. The combined population in 1879 was thought to exceed 1,500 (DeDecker, 1966). A dam was constructed at Twin Lakes to supply hydro-mechanical power. The mining boom led to construction of a wagon road from Benton, a toll road up the Sherwin Grade from Bishop, and a toll trail from Oakhurst to supply beef cattle (DeDecker, 1966).

During the mining boom, the Owens Valley became home to farmers and ranchers and had a population of several thousand people by the turn of the century (Irwin, 1991). Some Owens Valley ranchers drove cattle and sheep into the highlands of Long Valley and the upper Owens River area for summer and fall grazing in the 1880s (Burton and Farrell, 1992). There are no records of the extent or intensity of grazing for the first few decades. When the Inyo National Forest took over administration of the forested federal lands from the Sierra Timber Reserve in 1908, one of the first tasks was to control overgrazing (Millar, et al., 1996).

The mining town of Kearsarge in Onion Valley was destroyed by avalanches in 1864. Silver was discovered in 1865 at Cerro Gordo, east of Owens Lake. In 1872, the strongest earthquake in California's history devastated Lone Pine, which had about 250 residents at the time.

1900-1930

Many of the farms and ranches of Antelope Valley were consolidated in the 1880s by cattle baron Thomas B. Rickey. By the turn of the century, Rickey's operations were using enough water that downstream ranchers in Smith and Mason valleys believed that their water rights were being infringed upon. In 1899, work began on Topaz Reservoir and was later completed by downstream water interests that formed the Walker River Irrigation District in 1919. Water storage began in 1921, and by May 1924, about 30,000 AF of water were stored in Topaz Reservoir (California Department of Water Resources, 1992).

As more people in southern California accumulated wealth and leisure time in the early 1900s, the eastern Sierra Nevada including the Mammoth Lakes area became a destination for summer recreation. An automobile trip from Los Angeles required about two and a half days in 1914. A paved road along the eastern escarpment of the Sierra Nevada (close to the present route of U.S. Highway 395) would not be completed until 1931 (Irwin, 1991).

Large-scale development of the water of the Owens River began in 1903 when the U.S. Reclamation Service began a study of water resources in the eastern Sierra Nevada. Establishment of the Inyo National Forest was apparently linked to potential water development (Martin, 1992). Watershed protection was proclaimed as the reason for creating the Inyo National Forest by President Theodore Roosevelt in May 1907. After the lands were surveyed in 1905, one of the Forest Service employees wrote: "This addition will protect and regulate the water flow of the Owens River and its tributaries" and [the lands] "were set aside to protect the Owens River watershed, to protect the water supply of the City of Los Angeles" (Ayres, 1906; quoted in Martin, 1992). The City of Los Angeles began acquiring land and water rights in the Owens Valley as well as performing initial engineering work for an aqueduct and storage facilities in the early 1900s. Construction began in 1908, and water was flowing through the completed aqueduct in 1913. During a dry period in the 1920s and early 1930s, Los Angeles completed approximately 170 new wells in the Owens Valley to supplement water exports via the first aqueduct.

1930-present

The capacity of Topaz Reservoir was increased to about 60,000 acre-feet in 1937. The Marine Corps Mountain Warfare Training Center in Pickel Meadow was established in 1951.

Construction of the Mono Craters Tunnel and stream diversion works began in 1934, Grant Lake dam was enlarged in 1940, and water export from the Mono Basin began in 1941. Export capacity was increased in 1970 with completion of the second barrel of the Owens Valley aqueduct to Los Angeles. Several lawsuits regarding Mono Lake and tributary streams were settled in the 1980s, resulting in minimum flows for Rush and Lee Vining Creeks. In 1994, the State Water Resources Control Board issued decision D-1631, amending LADWP's water diversion licenses.

In 1932, the Los Angeles Department of Water and Power purchased Fred Eaton's ranch in Long Valley and began construction of the Long Valley dam. In the following years, the department purchased other properties in Long Valley to secure water rights of the tributaries to the Owens River. After water from the Mono Basin began to flow through the tunnel in 1941, the upper Owens River served as a canal with extra flows averaging 50,000-100,000 acre-feet per year for the next 50 years. The Pleasant Valley Dam was constructed in 1957.

In 1970, Los Angeles completed its second aqueduct and filled it with 1) increased groundwater exports from the Owens Valley, 2) increased surface water exports from the Owens Valley (obtained from reductions in irrigation water previously supplied to Owens Valley ranchers), and 3) increased surface water diversions from the Mono Basin. The consequent groundwater pumping impacts to Owens Valley springs and ecosystems stimulated a series of legal actions that resulted in a joint groundwater management agreement for Inyo County in 1991, the partial rewatering of 62 miles of the lower Owens River in 2006, and several other environmental mitigation projects, some of which have not yet been completed.

As automobiles became more common, the driving public pushed for more roads and those roads, in turn, influenced land use. Growth accelerated after World War II and winter recreation began to be a potent economic force. The first chairlift at Mammoth Mountain Ski Area was installed in 1955. Twenty-five lifts were in service by the mid-1980s, and snowmaking equipment began to be installed in the early 1990s. In 2004, the resort recorded 1.5 million skier-days, second only to Vail ski area.

The town of Mammoth Lakes began to grow significantly in the late 1960s. In 1971, the Inyo National Forest plan stated that Mammoth Lakes was the "fastest growing community in the country" (Millar, 1996). The 1990 census reported a population for the town of 4,785. Another period of dramatic growth occurred in the late 1990s, and the 2000 census reported a population of 8,214.

Land use

The Inyo-Mono IWRM planning area is largely in public ownership for conservation and management of natural resources. Only about 1.7 percent of Inyo County is in private ownership. Outdoor recreation on public lands by visitors from outside the region drives the local economies. Agriculture is the dominant land use on private property in the area. About 71,000 acres of Mono County and 22,000 acres of Inyo County are under irrigation for alfalfa, miscellaneous hay, and irrigated pasture. Agricultural activities also occur on public land in the planning area.

Recreation is a major land use and dominant economic force throughout the Inyo-Mono IRWM planning area because of the scenic beauty and high proportion of public land. The Inyo National Forest receives about ten million visitor-days of use per year. Recreation is also popular on lands of the Humboldt-Toiyabe National Forest, Bureau of Land Management, Death Valley National Park, and Los Angeles Department of Water and Power.

The Mammoth Mountain Ski Area is potentially the largest single source of sediment within the upper Owens River watershed. Mammoth Mountain has more than 30 ski lifts on a permit area of 3,200 acres with a design capacity of 19,000 skiers at one time. Ski areas have an inherent conflict between providing good skiing conditions with shallow snow and maintaining enough vegetation to minimize erosion. The steep slopes of ski runs also allow flowing water to apply sufficient force to readily dislodge soil particles. Besides these fundamental issues common to all ski areas, the pumice and poorly developed soils on Mammoth Mountain are prone to erosion once disturbed and stripped of vegetation. The ski area has an active erosion control program and has successfully established grasses on many of the ski runs. Most of the runoff from open ski runs is also channeled through sediment detention basins in an effort to reduce the movement of sediment beyond the ski area boundaries.

Compared to other parts of the Sierra Nevada, the potential for significantly increased erosion and sedimentation from off-highway vehicle (OHV) use is relatively small in the eastern Sierra Nevada because of the limited rainfall and snowmelt runoff. However, a critical exception to that statement occurs near and in water courses. When vehicles enter riparian areas and cross streams, there can be significant sediment movement, simply because of the presence of water. There have been anecdotal observations of OHV caused erosion in Glass and Deadman creeks in the past decade. The Inyo National Forest has attempted to address the problem through restricting vehicle use in the Glass/Hartley area.

Grazing

There was a period of severe overgrazing in the late 1800s to early 1900s throughout the Sierra Nevada that resulted in widespread changes in vegetation cover and composition and active channel erosion. The northern portion of the planning area was assumed to have been impacted in a manner similar to the bulk of the mountain range. An estimated 200,000 head of sheep grazed the

Walker River country around 1900 (USDA-Forest Service, 2004). The rangelands have been recovering ever since under less intense grazing pressure.

The upper Owens River watershed may not have been as severely overgrazed in the second half of the 19th century as many other parts of the Sierra Nevada because of the greater distance to markets and population centers. Although we know that Owens Valley ranchers drove livestock into Long Valley and beyond for summer and fall grazing in the 1880s (Burton and Farrell, 1992), there is little other documentation of the extent and intensity of grazing in the upper Owens watershed before 1900. When the first rangers of the Sierra Timber Reserve arrived in Mono County in 1903, their orders were to keep trespassing sheep out of the reserve (Millar, et al., 1996). Overgrazing apparently persisted through the 1940s. In 1944, the Inyo National Forest attempted to bring rangeland use, quantified by animal unit months (AUMs), closer to range productivity and resolve grazing damage to and conflicts with other resources (Millar, et al., 1996). Within six years of adopting that plan, grazing intensity on the whole forest had dropped by 40 percent.

The City of Los Angeles Department of Water and Power leases grazing rights on much of the land in the planning area. The Owens River from near the shore of Crowley Lake upstream to Benton Crossing was fenced in 2000 to exclude livestock from the riparian corridor. The initial study of channel and vegetation response to the rest from grazing was too short (three years) to show any changes (Jellison and Dawson, 2003). Other riparian fencing projects on tributaries that began in the 1990s demonstrated considerable improvement in riparian conditions over the longer periods (Jellison and Dawson, 2003).

Agriculture and forestry

In the northern portion of the region, agriculture, primarily cattle ranching, is the dominant land use in the broad Antelope and Bridgeport valleys. Pasture irrigation is the largest single use of agricultural water in Antelope Valley (California Department of Water Resources, 1992). Other areas of large-parcel private land include Little Antelope Valley and the Sonora Junction area. In the early 1970s, there were approximately 38 farms and ranches operating within the West Walker River watershed with a combined area of about 15,870 acres (USDA Nevada River Basin Study Staff, 1975).

In the 19th century, agriculture was the most extensive land use in the Mono Basin and relied on water diverted from the creeks on the west side of the basin. By the 1890s, perhaps 4,000 acres were irrigated for both crops and pasture (Vorster, 1985). The amount of land under irrigation probably peaked at about 11,000 acres in 1929 (Harding, 1962; cited by Vorster, 1985). As the City of Los Angeles acquired land and water rights in the 1930s, the amount of land under cultivation in the Mono Basin decreased.

Irrigated agriculture in the Owens Valley was practiced for hundreds of years by the native Piute people who constructed artificial channels to enhance the growth and volume of vegetative resources (Steward, 1934; Lawton, et al., 1976). EuroAmericans began to settle in the Owens Valley in the 1860s and rapidly cleared native vegetation to enable farming (Vorster, 1992). Irrigation canals were constructed, and more than 250 miles of canals and ditches were in place by 1890 (Babb, 1992). This extensive irrigation network allowed most of the average annual flow of the Owens River to be diverted and spread across tens of thousands of acres of cropland and pasture. By 1900, about 15,000 acres were cultivated and another 21,000 acres were intermittently irrigated for pasture (Vorster, 1992). By 1905, the diversion of water from the Owens River for irrigation had led to a 33-foot drop in the level of Owens Lake over the preceding 30 years. By 1913, in response to a few relatively-wet years and reduced irrigation on lands just purchased by the City of Los Angeles, the level of Owens Lake rose about 15 feet (Lee, 1915; Babb, 1992). As the City of Los Angeles acquired most of the land and water rights in the Owens Valley, agriculture declined rapidly. By the early 1990s, about 3,000 acres of alfalfa and other forage crops were irrigated along with about 8,000 acres of pasture, mostly under lease from the City of Los Angeles (Vorster, 1992).

The Walker River watersheds and the Mono Basin were major sources of lumber and fuel wood for the mines near Bodie and Aurora. A five-ton steamer was brought from San Francisco in 1879 to tow barges filled with lumber from Lee Vining Canyon across Mono Lake (Hart, 1996). Apparently, there were so few trees remaining near Lee Vining in the 1920s that lumber had to be brought from Mammoth and Bodie to build the school. In the early 1880s, a railroad was constructed on the east shore of the lake to transport lumber from Mono Mills, on the southeast side, toward Bodie. The logging camp at Mono Mills operated intermittently until 1917 (Hart, 1996).

Timber management on lands of the Inyo National Forest within the upper Owens River watershed has been a relatively small-scale activity compared to other national forests in the Sierra Nevada. Most of the harvesting has occurred in the Dry Creek, Deadman Creek, and Hartley Springs portion of the Glass Creek watershed on the west side of U.S. Highway 395 and the area northeast of Crestview. In the 1960s and 1970s, eight timber sales totaling about 60 million board feet were conducted in the watershed. These harvests removed large Jeffrey pines of high value per tree until about 30 percent to 40 percent of the large trees were cut. By the late 1960s, most of the forest east of the highway had been harvested in this manner, leaving half to two-thirds of the mature trees (Millar, et al., 1996). In 1979, the Inyo National Forest adopted a new plan for the area north of Mammoth Lakes that emphasized timber harvesting with only watershed consequences as a major constraint. Between 1979 and 1988, seven timber sales were harvested with about 30 million board feet of timber cut. As public and agency values shifted during the 1980s and 1990s, an old-growth forest management strategy was developed by the Inyo National Forest (USDA-Forest Service, 1992b). During the 1990s wintertime logging was conducted over snow cover in order to protect soils. By 2000, logs were no longer being trucked north out of the area. Currently, most timber harvest is used locally for fuelwood and lumber.

Mining

Following the discovery of gold at Dogtown in the East Walker River watershed, in 1857, prospectors moved south into the Mono Basin and found gold in and near Rattlesnake Gulch in 1858 or 1859 (Fletcher, 1987). The first town in what was to become Mono County, Monoville, grew rapidly around the Mono Diggings. The miners needed water to work the placer deposits and soon built a ditch from Conway Summit to import water from Virginia Creek (DeDecker, 1966).

The headwaters of Lee Vining Creek and Mill Creek were extensively prospected and mined in the 1870s and 1880s. The Great Sierra Silver Mine and Bennettville were established in Mine Creek, a tributary to Lee Vining Creek, between 1878 and 1888. The efforts of hauling mining equipment from Lundy, building the Great Sierra Wagon Road (eventually part of the route of the Tioga Pass road) from the west, boring deep tunnels in hard rock, as well as living at 10,000 feet, made Bennettville and the Tioga Mining District legendary (DeDecker, 1966).

Mining began in the Mammoth Lakes basin in the 1870s and played out relatively quickly. Prospecting throughout the watershed led to active mining in a few locations, but none of the mines was particularly successful. Prospecting and mining occurred all along the eastern slope of the Sierra Nevada, often for short periods following the boom and bust of mineral strikes. For example, Kearsarge City, serving the mines above Independence, was briefly the largest community in Inyo County in the mid-1860s. Mining and processing activities that produced tungsten and molybdenum in Pine Creek were a rare exception to the short mining cycle and persisted for several decades (Kurtak, 1998).

Mining in the northern Mojave region began in the late 1860s and peaked quickly during the 1870s with successful silver mines at Cerro Gordo, Panamint City, Darwin, and Tecopa. Mining of various salts from the lakebeds and playas of the region followed the silver boom. Extraction of borax from Death Valley and Searles Lake was profitable until supply overwhelmed demand by 1888. Gypsum, table salt, talc, potash, and soda ash were profitably mined from China Ranch, Saline Valley, Searles Lake, and other deposits. Mining operations still continue at Searles Lake (Tweed and Davis, 2003) with more than 1.75 million tons of chemicals exported from the Trona processing plant in 2005.

Hydroelectric generation

In 1893, a hydroelectric generating facility on Green Creek above the Bridgeport Valley began supplying alternating current to the Standard mill in Bodie.

Water from Mill Creek was diverted to generate hydroelectric power in the early years of the 20th century. In 1911, the Lundy Project was completed by the Southern Sierra Power Company (Perrault, 1995). Construction of a dam raised the natural outlet of Lundy Lake 37 feet to an elevation of 7,803 feet (Stine, 1995). Lundy reservoir has a surface area of 130 acres and a usable capacity of about 3,800 AF (Perrault, 1995). The diversion to the Lundy powerhouse has a capacity of about 70 cfs. Southern California Edison assumed ownership and control of the hydroelectric facilities in 1962 as Federal Energy Regulatory Commission project 1390.

Regulation of the flows in Lee Vining Creek for hydroelectric generation began in 1921 (now FERC project 1388). Ellery, Tioga, and Saddlebag reservoirs in the headwaters of Lee Vining Creek have a combined storage capacity of 13,600 acre-feet. Much of the creek's flow is contained within a penstock between Ellery Lake (9,490 feet) and the Poole Powerhouse (7,840 feet). About 27,000 acre-feet of water flow through the powerhouse each year.

Between 1916 and 1925, dams were constructed to enlarge Agnew and Gem lakes and at Rush Creek Meadows to form Waugh Lake to allow storage and regulation of water for the Rush Creek powerhouse near Silver Lake. Waugh, Gem, and Agnew reservoirs can store 4,980, 17,060, and 860 acre-feet, respectively, for Southern California Edison's FERC project 1389.

Following the completion of the Long Valley dam, which regulates Crowley Lake, the Los Angeles Department of Water and Power constructed a series of penstocks and power houses downstream in the Owens Gorge. The system began operation in 1953, and the Owens River was effectively dried up within the Gorge. In 1991, an error in the operation of the system damaged a penstock, and water was released back into the natural channel. Once the river began to flow again, the total diversion could not legally resume under the state Fish and Game Code. Managed streamflow, riparian vegetation, and a trout fishery have been restored within the Owens Gorge.

The Bishop Creek hydroelectric system diverts water from the south and middle forks of Bishop Creek and generates electricity at four powerhouses. The system began more than a century ago when the Nevada Power, Mining, and Milling Company began to transmit electricity from their Bishop Creek powerhouse to Tonopah in 1905. Over the following eight years, the Nevada-California Power Company constructed dams that formed South Lake and Lake Sabrina and built five powerhouses that utilized more than 3,500 feet of head. The original wood-stave pipe was replaced between 1949 and 1983 (JRP Historical Consulting Services and California Dept. of Transportation, 2000). The system is now operated by Southern California Edison under FERC license 1394.

The Los Angeles Department of Water and Power operates hydroelectric facilities on Big Pine Creek, Division Creek, Haiwee Reservoir, and Cottonwood Creek. The Division Creek powerplant was built in 1905 to supply electricity to help with construction of the aqueduct. North and South Haiwee reservoirs have a combined storage capacity of about 58,000 acre-feet. In 2008, LADWP proposed the concept of a new hydroelectric plant at Tinemaha Reservoir.

Large-scale solar power projects have been proposed on and near Owens Dry Lake in 2010.

Roads

Many of the roads in eastern Sierra Nevada watersheds have direct impacts on channels and riparian systems because the roads are built on floodplains, in the riparian zone, and/or make frequent crossings of the stream. The most obvious example is U.S. Highway 395 through Walker Canyon. Slopes disturbed by the road placement and construction were long-term sources of sediment to the West Walker River. This section of road was largely destroyed by the flood in January 1997. Portions of other paved roads are often adjacent to or cross major streams. Unpaved forest roads have many areas of contact with streams and riparian zones and are sources of sediment. GIS analyses by Mono County found that the West Walker River watershed contains more than 490 miles of mapped roads that cross streams in at least 380 places, and more than 38 miles of roads are within 100 feet of a stream. In the upper Owens River watershed, the total length of roads is about 1,750 miles, there are more than 1,200 stream crossings by roads, and more than 120 miles of road are within 100 feet of a stream.

Wild and Scenic River Status

The main channel of the West Walker River from the headwaters near Tower Lake to the confluence with Rock Creek near the town of Walker and Leavitt Creek downstream from Leavitt Falls were added to California's Wild and Scenic River System in 1989. The designated section includes about 33 river miles of the main stem and about 5 miles of the tributary Leavitt Creek (California Department of Water Resources, 1992).

The California Wild and Scenic Rivers Act of 1972 preserves designated rivers possessing "extraordinary scenic, recreational, fishery, or wildlife values" in their free-flowing condition. The act prohibits construction of dams, reservoirs, and most water diversion facilities on river segments included in the system (California Department of Water Resources, 1992). The major difference between the national and state acts is that if a river is designated wild and scenic under the state act, the Federal Energy Regulatory Agency can still issue a license to build a dam for hydropower generation on that river. Because of this difference, designation under the National Wild and Scenic Rivers Act (1968) affords enhanced protection (Horton, 1996).

A special provision of the California Wild and Scenic Rivers Act applies to the West Walker River because it is an interstate stream and a source of agricultural water and domestic water: "The California Wild & Scenic Rivers Act does not prohibit the replacement of diversions or changes in the purpose of use, place of use, or point of diversion under existing water rights, except that no such replacement or change shall operate to increase the adverse effect, if any, of the preexisting diversion facility or place or purpose of use, upon the free-flowing condition and natural character of the stream, and no new diversion shall be constructed unless and until the Resources Secretary determines that the facility is needed to supply domestic water to the residents of any county through which the river or segment flows and that the facility will not adversely affect the free-flowing condition and natural character of the stream." (http://www.dot.ca.gov/ser/vol1/sec3/special/ch19wsriverschap19.htm#ch19WestWalker)

In 2009, federal Wild and Scenic River status was granted to the headwaters of the Owens River, including Glass Creek and Deadman Creek and portions of the Amargosa River.

Aquatic Conservation Areas

The Sierra Nevada Forest Plan Amendment (aka Sierra Nevada Framework) process of the USDA-Forest Service initiated a series of new aquatic conservation measures. The Humboldt-Toiyabe National Forest applied this management direction to the establishment of several "critical aquatic refuges." These refuges were identified in the Framework amendment as small watersheds that contain:

- known locations of threatened, endangered, or sensitive species;
- highly vulnerable populations of native plant or animal species;
- localized populations of rare native aquatic- or riparian-dependent plant or animal species.

The primary management goal for critical aquatic refuges is to preserve, enhance, restore or connect habitats distributed across the landscape for sensitive or listed species to contribute to their viability and recovery (USDA-Forest Service, 2004).

Land ownership and interagency cooperation

Land ownership in the Inyo-Mono region is primarily public (Figure 3-3). Approximately 94% of Mono County is publicly owned: 88% is owned by the federal government (US Forest Service and the Bureau of Land Management), 6% by city and state governments, and the remaining 6% is privately owned. The City of Los Angeles owns about 63,000 acres of land in the southern portion of Mono County. Ninety-two percent of Inyo County is federally owned, about 2% is state-owned lands, and the City of Los Angeles owns approximately 4% of the land in Inyo County. The Shoshone and Paiute Indian tribes also own Reservations or Colonies throughout the region.

At the watershed level, a couple of examples from the northern portion of the region illustrate the prevalence of public land. More than 85 percent of the West Walker River watershed is in public ownership by the USDA-Forest Service, USDI-Bureau of Land Management, and the California Department of Fish and Game for resource management purposes (USDA Nevada River Basin Study Staff, 1975). More than 90 percent of the Mono Basin is USDA-Forest Service, Bureau of Land Management, or Los Angeles Department of Water and Power land. Since 1981, the California Department of Parks and Recreation has also been involved, following the creation of the Mono Lake Tufa State Reserve. The state reserve consists of approximately 6,000 acres of the shoreline of Mono Lake, including landscapes ranging from alkali flats to highly productive wetlands, and the bed and waters of the lake itself. The Inyo National Forest administers the Mono Basin National Forest Scenic Area, established by Congress in 1984. A management plan for the Scenic Area includes some provisions for private property within the boundaries. Mono County and the USDA-Forest Service have different land-use restrictions, both of which must be met by private landowners.

Land use planning within the Inyo-Mono IRWM region is fragmented with respect to the varied ownership of the land. The two federal agencies (USDA-Forest Service and USDI-Bureau of Land Management) and the Los Angeles Department of Water and Power administer most of the area. Private land is subject to zoning and planning controls of the county governments or the three incorporated jurisdictions (Ridgecrest, Bishop, and Mammoth Lakes). Within Mono County, the Mono County Collaborative Planning Team has been somewhat successful in coordinating land use planning between the different agencies since its formation in 1996. Although information exchange has been its primary influence to date, there is great potential through this mechanism to affect general policies and decisions that have widespread consequences.

Part of the public land administered by the Bureau of Land Management, mostly in the vicinity of Crowley Lake, is covered by "watershed withdrawals" made by Congress and the President in the 1930s. The original purpose of these withdrawals was to prevent speculative homesteading in anticipation of acquisition by the City of Los Angeles. The particular status of these lands prevents their sale or exchange, may influence federal water rights appurtenant to these lands, and gives the BLM additional legal status with respect to any hydropower licenses within the designated area.

Demographics, residential development, and economy

Compared to most of California, the Inyo-Mono IRWM region is very sparsely populated. Mono County has a population density of about four people per square mile, and Inyo County has only two people per square mile. The City of Ridgecrest within the small part of San Bernardino County that is in the Inyo-Mono IRWM region constitutes about half of the total population of the region (24,927; 2000 Census).

Table 3-6. Population of Inyo and Mono Counties between 1970 and 2000

	1970	1980	1990	2000
Inyo	15,571	17,895	18,281	17,945
Mono	4,016	8,577	9,956	12,853

The West Walker River watershed contains four communities: Walker, Coleville, Camp Antelope, and Topaz. The population of Antelope Valley was 574 in 1970 and 1187 in 1980. The footprint of these communities is quite small. Similarly, in the East Walker River watershed, Bridgeport (county seat of Mono County) is the only community with much population (about 1,000). The economies of these basins are based on agriculture, tourism, government services, and the U.S. Marine Corps Mountain Warfare Training Center and its affiliated housing compound near Coleville.

There are three communities within the Mono Basin: June Lake, Lee Vining, and Mono City. Private property is limited outside those communities. Lee Vining has a population of about 350 people, includes about 20 businesses along U.S. Highway 395, and occupies about 30 acres. Mono City is a community of approximately 100 residents near the junction of U.S. Highway 395 and State Route 167. The population of June Lake is about 650. The communities of Lee Vining and June Lake have economies focused on travelers and tourism. The June Mountain Ski Area attracts winter visitors. These communities serve as centers for hiking, mountain biking, fishing, camping, and skiing.

Mammoth Lakes is the largest community in the upper Owens River watershed, with an area of four square miles and a population of about 7,500. The peak population during holiday periods and busy weekends in 2005 was about 35,000. These large variations in population from day to day have created an unusual set of problems for planning and operations for water supply and sewage disposal as compared to municipalities with relatively stable water use. The Mammoth Mountain Ski Area is a major driving force in the local economy and the largest employer in Mono County. Other tourism-dependent businesses constitute a significant fraction of economic activity. Residential construction is an episodically important source of employment in southern Mono County.

Ranches along the upper Owens River have remained as relatively large undeveloped parcels, and a few upland areas with access to water along the old road have been subdivided in the communities of Aspen Springs, Hilton Creek/Crowley Lake, McGee Creek, Long Valley, and Sunny Slopes. Beyond these communities and Mammoth Lakes, the upper Owens River watershed contains only a few scattered homes.

In the Owens Valley, the principal communities with their respective populations (where available) are Swall Meadows (250), Paradise, Rovana, Starlite, Aspendell, Bishop (4,000), Big Pine (1,400), Independence (600), Lone Pine (700), Keeler (<100), Cartago (110), and Olancha (130). North of Bishop, principal communities are Chalfant and Hammil (700 combined) and Benton and Benton Hot Springs (400 combined). People older than 64 constitute 20 percent or more of the population of the larger communities of the Owens Valley (versus 11 percent of California's population), which suggests that the area is favored by retirees and a significant proportion of the valley's total income is from transfer payments. The Los Angeles Department of Water and Power is a major employer throughout the Owens Valley.

In the northern Mojave desert zone, the principal communities are Furnace Creek (50), Darwin (50), Trona, Ridgecrest (30,000), Inyokern (1,000), Shoshone (50), and Tecopa (100). Ridgecrest has a vastly greater impact on water resources than the smaller communities. The economy of Ridgecrest is fundamentally tied to the adjacent China Lake Naval Weapons Station.

Descriptive hydrology

Runoff generation and water balance

The eastern Sierra Nevada part of the Inyo-Mono IRWM planning area has a runoff pattern dominated by snowmelt from April through July that is typical of most Sierra Nevada rivers. A winter snowpack usually begins to accumulate in November at the higher elevations, attains maximum water storage in late March or early April, and then melts over the next 2-3 months. After several months of low discharge during autumn and winter, the streams begin to rise during April with the initial snowmelt and carry sustained high flows through May and into June. As the snowpack gets thinner and snow cover disappears from successively higher elevations, streamflow declines through summer and eventually reaches the minimal flows of autumn. For example, approximately 81 percent of the annual runoff of Mill Creek in the Mono Basin has been attributed to snowmelt, occurring from April through September, and the remaining 19 percent of the annual streamflow occurs as base flow from October through March (Perrault, 1995). Occasionally, a warm winter storm brings enough rainfall over enough of the watershed to raise streamflow for a few days. On rare occasions, these storms lead to significant rainfall and runoff that have generated the largest floods on record.

The northern Mojave Desert zone generates very little runoff, and that runoff is isolated in time and space. Occasional winter storms produce sufficient rainfall to generate runoff from overland flow or downslope water movement through soil layers to a nearby channel. Intense summer thunderstorms can also put a lot of water into channels in a short period of time, creating flash floods. Runoff is also produced by groundwater outflow at seeps and springs. Even where there is some runoff, it often infiltrates back into the bed of the channel not far from the source. Most of the time, most of the channels in the northern Mojave Desert are dry.

A water balance is a useful tool for understanding the various quantities of water involved in different parts of the hydrologic cycle within a particular watershed. Water balances basically show what fraction of incoming precipitation becomes runoff versus what fraction is loss to the atmosphere or adds to groundwater storage.

For example, a coarse water balance (starting with generated runoff from small tributaries) of the entire Walker River basin estimated that 184,700 AF of runoff enter the upper West Walker River and 1,000 AF evaporate before the river enters Antelope Valley. Within Antelope Valley, another 28,700 AF enter and 38,400 AF are lost to evapotranspiration (31,300 AF from irrigated fields, 2,800 AF from phreatophytes, and 4,300 AF from lake surfaces) for a net export from Topaz Lake of 174,000 AF (Carson River Basin Council of Governments, 1974).

A thorough water balance of part of the Owens Valley aquifer system showed how groundwater storage can change over a period of years (Table 3-7; Hollett, et al., 1991).

Table 3-7. Water balance for part of the Owens Valley aquifer system for water years 1963-1969 and 1970-1984.

	Average Annual Values (AF)	
Component	**WY 63-69**	**WY 70-84**
Precipitation	+2,000	+2,000
Evapotranspiration	-112,000	-72,000
Tributary streams	+106,000	+103,000
Mtn front non-stream recharge	+26,000	+26,000
Runoff from outcrops within fill	+1,000	+1,000
River & Aqueduct seepage	-16,000	-3,000
Spill gates	+6,000	+6,000
Lower Owens River	-5,000	-3,000
Lakes & reservoirs	+1,000	+1,000
Canals, ditches, & ponds	+32,000	+31,000
Irrigation and watering of stock	+18,000	+10,000

Pumped and flowing wells	-20,000	-98,000
Springs and seeps	-26,000	-6,000
Underflow into aquifer system	+4,000	+4,000
Underflow out of aquifer system	-10,000	-10,000
Total recharge	+196,000	+184,000
Total discharge	-189,000	-192,000
Change in groundwater storage	-7,000	+8,000

In this water balance, negative change in storage means water is entering groundwater storage and a positive change in storage means that groundwater is flowing out of storage. The terms are thoroughly explained in the cited report. The summary is provided here just as an example of a water balance within the Owens Valley.

Streamflow averages and extremes

The eastern Sierra Nevada region, especially Owens River watershed, has an unusually high density of streamflow measuring stations, in part because of the high value of the water resources in the area. Streamflow in the eastern Sierra Nevada is highly variable over time, so information about the range in values and the time period considered is at least as important as averages. For example, the extremes in observed annual flow of some of the tributaries to the upper Owens River illustrate this variability (Table 3-8; Smith and Aceituno, 1987):

Table 3-8. Annual flow for five upper Owens River tributaries (cfs)

Stream	Mean	Minimum	Maximum
Convict Creek	26	10	75
Glass Creek	8	2	20
Deadman Creek	6	2	20
Rock Creek	26	13	70
Upper Owens R.	30	15	70

Tributaries to the Owens River from the Sierra Nevada contribute significant volumes of water each year, primarily during the April though July snowmelt-runoff season. Only two streams on the east side of the Owens Valley have any appreciable flow: Coldwater Canyon and Silver

Canyon Creek; however, these streams typically discharge less than 2,000 acre-feet/year. In the Inyo Range, Mazourka Creek (USGS station 10282480) was monitored between 1961 and 1972. No flow was recorded all days except during two brief periods in 1967 and 1969. During these periods, discharge peaked at more than 1,300 and 600 ft^3/s, respectively (Hollett et al., 1991; Danskin 1998).

Droughts and floods

As noted in the climate section, severe and persistent droughts occurred in the West Walker River watershed during AD 890-1110 and 1210-1350 (Stine, 1994). These dry periods had so little streamflow that Jeffrey pine trees grew on the bottom of the channel in the Walker River Canyon. Modern dry spells are short and wet by comparison.

During the past century, periods with well-below average precipitation in the West Walker River watershed occurred in 1924-25, 1928-34, 1960-61, 1976-77, and 1988-92. Topaz reservoir was drained below its operating capacity at times during these dry years. Downstream in Nevada, the Walker River stopped flowing at the Wabuska stream gage in 1924-25 and 1931 (California Department of Water Resources, 1992).

Two serious multi-year droughts occurred in the most of the region in the past century: 1923 through 1935 and 1987 through1992 (Jones and Stokes Associates, 1993a: Appendix H). Streamflow was also much below average in 1976 and 1977. In addition to an occasional dry year, there have been five periods over the past century in which precipitation and resulting runoff in the upper Owens River were well below average for multiple years: 1928 to 1934, 1959 to 1961, 1976 to 1977, 1987 to 1992, and 2000 to 2004. These periods did not correspond exactly with dry periods noted above for the West Walker River.

At the opposite extreme, floods are a basic attribute of channels in the eastern Sierra Nevada and northern Mojave Desert. Hydrologic and geomorphic processes that create alluvial channels tend to make the channel capacity adequate only to handle peak flows that happen with an average frequency of about 1.5 years (or probability of about 0.67). Peak flows above the channel capacity spill out onto the floodplain and are termed floods. Routine floods rarely have much impact beyond continuing to shape the channel and its adjacent floodplain. However, every few years, various conditions combine to generate considerably larger floods that catch our attention. As the magnitude of floods increases, the frequency of such flows decreases. For example, a very large flood may occur only once in a century (on the average over a very long period of time). This average frequency (sometimes called a return period or recurrence interval) can also be expressed as a probability of occurrence in any given year (*e.g.,* a “one-hundred year flood” has a probability of 0.01 in a particular year).

In the West Walker River, damaging floods occurred in 1950, 1955, and 1997. Prior to the January 2, 1997, peak of about 12,500 cfs, the flood peak of record at the West Walker River near the Coleville gage was 6,500 cfs on Dec. 11, 1937 (California Department of Water Resources, 1992). Floods that cause widespread damage throughout the entire watershed are relatively uncommon. Types of floods in the Walker watershed include winter rain floods, spring snowmelt floods, and localized floods often associated with summer thunderstorms.

Flood damage from the winter rainstorms is most significant in Antelope Valley where low-lying lands can be inundated in even relatively small rainstorms (California Department of Water Resources, 1992). Many lots in the community of Walker, especially between North River Lane and Meadow Drive, are within the 100-year flood plain of the West Walker River (Mono County Office of Emergency Services, n.d.; Mono County Department of Public Works, 2002).

Snowmelt runoff in 2005 largely filled the channel of the West Walker River within Antelope Valley. In late May, water levels ranged between 8 and 9.2 feet at a gage where 9.0 feet is considered flood stage. Minor flooding was reported between Walker and Topaz. Snowmelt runoff again filled the West Walker River to near flood stage in May 2006.

In the Mono Basin, floods that were significant from a watershed management perspective occurred in 1967 and 1969 in Rush and Lee Vining creeks. These snowmelt floods of the late 1960s greatly eroded the channels and moved enormous amounts of sediment.

Within the Town of Mammoth Lakes, the 100-year (0.01 probability) peak flow in Mammoth Creek was estimated at 550 cfs (Environmental Sciences Associates, 1984). Some houses adjacent to the Snowcreek Meadow and immediately downstream could get wet under extraordinary flood conditions, especially if debris jammed the bridges on Minaret and Old Mammoth roads.

Because of the large size of the Owens River watershed (425 mi^2 at Round Valley and 1,975 mi^2 at Big Pine) and its wide range of hydrologic conditions, flood peaks tend to be influenced by the relative timing of peaks in the tributary streams and areal distribution of runoff along with the total volume of water flowing in the main channel (Kattelmann, 1992). Therefore, the largest peak flows at one place along the river do not necessarily coincide with those at other sites along the channel. For example, the largest flood of record (December 12, 1937) on the Owens at Round Valley and Pleasant Valley was attenuated to a comparatively average event by the time it reached Big Pine and Lone Pine. Four floods exceeding twice the mean annual-flood at the gage near Big Pine have occurred during the past century. This index of flood activity is similar to the average for rivers of the western slope of the Sierra Nevada (Kattelmann, 1992). The Los Angeles aqueduct has been significantly damaged by floods within the Owens Valley on at least four occasions: January 1943, October 1945, December 1966, and August 1989.

The Amargosa River floods in response to prolonged winter storms as well as intense rainfall during summer. Of the 33 annual peaks recorded at the gage at Tecopa, 20 occurred from July through October and 13 occurred from November through March. The flood of record on the Amargosa at the Tecopa gage was about 10,600 cfs on August 19, 1983. The second highest peak was about 5,000 cfs on February 26, 1969.

Groundwater

Groundwater resources are important throughout the Inyo-Mono IRWM planning area, but are particularly valuable in the northern Mojave Desert zone where surface water is severely limited. Most of the aquifers that are pumped in the region are unconsolidated alluvial or lakebed deposits in the vicinity of major streams or Pleistocene lakes. Groundwater infrastructure is most developed in the Owens Valley and Indian Wells Valley. The California Department of Water Resources in its Bulletin 118 (2010) identified about 60 distinct groundwater basins within the Inyo-Mono IRWM planning area. None of these basins has sufficient data to calculate an adequate groundwater budget. A few of these basins are described below as examples of groundwater resources and use.

Within the West Walker River basin, groundwater is found in two relatively distinct portions of the hydrologic system. Some water is below the ground surface for short periods of time (hours to months) as it flows downslope toward a surface channel or one of the three groundwater basins. This shallow groundwater can be considered as the slow portion of the runoff generation, and most of it ends up as streamflow or is captured by plant roots and lost to the atmosphere. The second type of groundwater can be considered to be in long-term storage (years to centuries), either within fractured bedrock or in the deep groundwater basins of Antelope Valley, Little Antelope Valley, or Slinkard Valley. Alluvial sediments have accumulated to depths of dozens to hundreds of feet within these structural basins and have vast storage space in the pores between the particles. The estimated storage capacities of the groundwater basins of Antelope and Slinkard valleys are 160,000-170,000 and 72,000 AF, respectively (California Department of Water Resources, 1964). These estimates were based on a storage interval between 10 and 100 feet and a specific yield of 5 percent to 15 percent.

A recent report by the California Department of Water Resources contained a little information on groundwater levels within the Antelope Valley. Based on 76 domestic well completion reports, depths ranged from 48-415 feet with an average of 184 feet. Based on nine irrigation well completion reports, depths ranged from 130-365 with an average of 253 feet. There is no routine monitoring of well levels reported to the state (California Department of Water Resources, 2004). Agricultural irrigation is a significant contributor to groundwater recharge throughout the Antelope Valley. Water infiltrates from the canals, and a lot of applied water infiltrates below the root zone of crops (California Department of Water Resources, 1992).

Groundwater in the Long Valley caldera portion of the upper Owens River watershed can be grouped into three basic categories: a relatively shallow cold-water system (less than 800 feet), a shallow thermal system, and a deep thermal system. The cooler waters are of excellent mineral quality while the warmer (> 80°F) waters have higher concentrations of dissolved solids (USDA-Forest Service, 1994. More than 45 wells have been drilled in the Mammoth Lakes basin since 1976 (USDA-Forest Service, 1994). The Mammoth County [now Community] Water District drilled its first three wells between 1976 and 1980. The depths were 382, 630, and 354 feet. Out of 24 wells, only one yielded good quality water at pumping capacities greater than 200 gallons per minute (well #1, 600 gpm, 500 acre-feet yield). Most of this yield was believed to come from fractured volcanic rocks (Mammoth County Water District, 1981; Gram / Phillips, 1985). Additional wells drilled since 1987 have been more productive (Mammoth Community Water District, 2005).

The main aquifer for the warm springs at the Hot Creek fish hatchery is a fractured basalt flow (Lipshie, 1979). Materials filling the Long Valley caldera include interbedded volcanic rocks (lava flows and tuffs) and sedimentary deposits (lakebeds, stream deposits, and glacial outwash). Fractured lava flows tend to be more permeable than poorly sorted sediments, such as glacial materials (California Department of Water Resources, 1973:31-36). The overall circulation of shallow groundwater is from west to east. An order-of-magnitude estimate of the time required for groundwater to circulate through the system from recharge in the west to discharge at the hot springs along Hot Creek is 100 to 1,000 years (Lipshie, 1979).

The Owens Valley groundwater basin has a surface area of just over 1,000 square miles and a productive aquifer about 1,200 feet thick. Total storage capacity has been estimated to be between 30 and 35 million acre-feet (California Department of Water Resources, 2004). Average annual recharge has been estimated as 184,000 acre-feet and pumping and outflow to springs averages about 110,000 acre-feet per year under the conditions of 1970 to 1984 (Danskin, 1998). Another 72,000 acre-feet per year of groundwater is removed through evapotranspiration. The water table within the city limits of Bishop is largely within ten feet of the surface (Nolte Associates, 2008).

The Indian Wells Valley groundwater basin (DWR Bulletin-118 #6-54) has a surface area of approximately 600 square miles and is enclosed by the Sierra Nevada on the west, the Coso Range on the north, the Argus Range on the east, and the El Paso Mountains to the south. The average depth of basin fill sediments is about 2,000 feet, with more than 7,000 feet of fill in the western portion of the valley (Couch, et al., 2003). A near-surface aquifer that may have been contaminated in parts of the Naval Air Weapons Station at China Lake overlies a regional aquifer at depths of a few tens of feet to several hundred feet below ground surface. Clays deposited in the Pleistocene-age lakes that constitute much of the Indian Wells Valley groundwater basin form a barrier between the shallow and deep aquifers.

The regional aquifer has been extensively utilized to supply water for agriculture, the city of Ridgecrest, town of Inyokern, scattered residences, and the Naval Air Weapons Station at China Lake. The use of water for irrigation in the Indian Wells Valley dates back to an early alfalfa farm in about 1910. Current pumping for irrigation supports alfalfa and various field and orchard crops. In 2001, the largest producers of groundwater in the basin were the Indian Wells Valley Water District (production of approximately 8,400 acre-feet per year), private agricultural users (7,900 acre-feet per year), Naval Air Weapons Station at China Lake (2,800 acre-feet per year), and Searles Valley Minerals (2,700 acre-feet per year) (Couch, et al., 2003).

A large pumping depression is found in the vicinity of the Intermediate Well Field of the Indian Wells Valley Water District. Between 1921 and 1988, groundwater levels declined about 80 feet in this area (Indian Wells Valley Water District, 2002; cited by Couch, et al., 2003). Groundwater levels continue to decline at a rate of 1.0 to 1.5 feet per year near this well field and under Ridgecrest. This groundwater depression results from pumping of the District's water supply wells, agricultural wells, and private supply wells (Couch, et al., 2003).

Concern has been expressed regarding the sustainability of groundwater as a resource in the Indian Wells Valley. Groundwater production has decreased from about 30,000 acre-ft/yr in the mid 1980s to about 25,000 acre-ft/yr currently. Estimates of overdraft range between 16,000 and 29,000 acre-ft/yr. The primary limitation on quantifying the amount of overdraft is accurately determining recharge into the basin. Groundwater flow directions and gradients are now primarily controlled by pumping from water supply wells (Couch, et al., 2003). A groundwater budget estimated that the volume of annual pumping is about twice the amount of recharge under 1985 conditions (Bean, 1989).

A cooperative groundwater management group is attempting to manage the aquifer system of the Indian Wells Valley. The major users of groundwater in the valley - Indian Wells Valley Water District, Naval Air Weapons Station at China Lake, and Searles Valley Minerals - have prepared a plan with the goal of extending "the useful life of the groundwater resources to meet current and foreseeable user needs in the Valley" (Indian Wells Valley Cooperative Groundwater Management Group, 2006).

Water demand and projections

The principal uses for water in the Inyo-Mono IRWM planning area are agriculture and export. A best guess for water applied to irrigated fields and pastures is 250,000 to 350,000 acre-feet per year, based on about 90,000 acres of irrigated land in the two counties and an average application of 3 to 4 feet of water per season. The quantity of water exported to Los Angeles is better known with an average of 360,000 acre-feet per year and a range of 100,000 to 500,000 acre-feet per year since 1970 (Harrington, 2009). Environmental and residential/commercial demands involve smaller quantities of water. Industrial and military demand is very small outside of the Ridgecrest and China Lake area.

In rural parts of Mono County, households with extensive lawn and garden irrigation have used between 200 and 400 gallons per day per capita (Gram/Phillips Associates, 1980). Where outside watering is modest, per capita water use in Mono County is 125 to 150 gallons per day. Because very little land is available for development, significant population growth is not anticipated in Mono County, and domestic consumption totals should grow at relatively slow rates (less than 0.1 percent per year). Nevertheless, there could be local inadequacies in water supply because whatever growth occurs will be concentrated in relatively small areas.

Within the town of Mammoth Lakes, water demand has grown rapidly over the past two decades. Total water use within the town was 2,565 acre-feet in 1992, 2,641 acre-feet in 1995, 3,287 acre-feet in 2001, and about 3,600 acre-feet in 2005 (Mammoth Community Water District, 2005). An assessment for the town's general plan update forecasts total annual water use in 2020 to range from 4,460 to 5,430 acre-feet, depending on planning alternatives (Mammoth Community Water District, 2005). At full build-out, the town could need about 6,000 acre-feet per year.

In Bishop, average daily demand per capita between 1997 and 2006 ranged from 400 to 490 gallons per day (Nolte Associates, 2008). About 1.6 million gallons per day were supplied by the City of Bishop Department of Public Works in 2004. The maximum daily demand was 4 million gallons per day. About half the city's water use occurs from June through September. There is very little undeveloped private land within the boundaries of Bishop and therefore, little opportunity for growth and related increases in water demand. However, if vacant properties currently owned by the Los Angeles Department and Power within the Bishop city limits were to be made available and developed, then the average water demand at full build-out could rise to 5.7 million gallons per day (70 percent commercial and 30 percent residential) (Nolte Associates, 2008).

Water demand within the Indian Wells Valley Water District has averaged about 8,800 acre-feet per year or about 280 gallons per day per capita. Potential increases in demand have been forecast in the Indian Wells Valley groundwater basin (Couch, et al., 2003). Although demand within the Indian Wells Valley Water District is anticipated to increase about two percent per year through 2020 and individual well use is forecast to increase about one percent per year, decreased demand by the Naval Air Weapons Station at China Lake and the Inyokern Community Services District results in a net increase in demand of only about 0.1 percent per year (Couch, et al., 2003).

Environmental water demand can be considered as either natural or regulatory. Evapotranspiration from lakes, soils, and native (or at least unmanaged) vegetation uses a large fraction of the precipitation that falls in the planning area – about half in high-elevation catchments and approaching 100 percent in low-elevation desert areas. In recent years, the term "environmental water demand" has also come to be used for managed water that is required to be used for some environmental benefit, such as a minimum instream flow to maintain fish and other aquatic species or sufficient water to support wetlands and riparian areas. As part of their water rights licenses, the Los Angeles Department of Water and Power must now leave defined amounts of water in Mono Lake tributaries, and the Mammoth Community Water District does not divert water from Mammoth Creek when prescribed minimum flows are not met. In the Owens Valley during 2007, the City of Los Angeles allocated 67,000 acre-feet for dust control at Owens Lake, 22,000 acre-feet to rewater the lower Owens River, 11,000 acre-feet to mitigation projects, and 10,000 acre-feet for recreation and wildlife uses (Harrington, 2009).

Water supply projections

Water supplies for the Inyo-Mono IRWM region are forecast to remain largely as they are today: variable and uncertain. Water is not imported into the region, and there are no plans to do so. There is no known litigation pending that could greatly alter supplies. Political and legal action in the Walker River basin could eventually result in transfers of water out of irrigation to provide more water for Walker Lake. Climate change has the potential to increase variability of precipitation, change the average amount of precipitation, increase the proportion of rainfall (versus snowfall), and alter the timing of snowmelt runoff. In the Indian Wells Valley, declining groundwater levels may increase pumping costs and thereby increase the cost of water supply.

Diversions, storage, and use

Water storage and transfers in the Inyo-Mono IRWM planning area are dominated by the Los Angeles Aqueduct system. All other water engineering within the area is minor by comparison. The project involves extensive infrastructure (Figure 3-2) and vast land holdings (Figure 3-3). Major components of the LADWP water export and power generation system include a series of reservoirs and a tunnel for exporting water from the Mono Basin to the Owens River headwaters; the Crowley Lake reservoir in Long Valley; diversions in the Owens River Gorge for power generation; hydropower generation on Big Pine, Division, and Cottonwood Creeks; the Tinemaha, Pleasant Valley, and Haiwee Reservoirs; extensive groundwater pumping capacity, and the Los Angeles Aqueduct. Los Angeles' land and water ownership and extensive infrastructure along the east slope of the Sierra link many water management issues in the western part of the Inyo-Mono IRWMP.

Within the Mono Basin, the Los Angeles Department of Water and Power diverted as much as 134,600 acre-feet and as little as 15 acre-feet between 1941 and 1980. After the completion of the second aqueduct, LADWP diverted more than 100,000 acre-feet annually, except during 1976-77 drought (Hashimoto and Qasi, 1981). Diversions were halted by court order from 1989 to 1994. Starting in 1995, diversions up to 16,000 acre-feet per year resumed under Decision 1631.

In the upper Owens River watershed, Crowley Lake was created by construction of Long Valley dam in the early 1940s. The reservoir is the main storage within the LA Aqueduct system and has a capacity of 183,000 acre-feet. Raising the height of the Long Valley dam has been discussed for many years. The general idea would be to increase the high-water elevation of Crowley Lake by 10 to 20 feet. Such an increase in height would provide an additional 60,000 to 130,000 acre-feet of storage capacity (Los Angeles Department of Water and Power, 1986). At the other end of the Owens Gorge, Pleasant Valley Reservoir was built in 1955 to modulate flows released from the hydroelectric facilities in the Owens Gorge. This reservoir can store up to 3,825 acre-feet.

Exports from Owens Valley to Los Angeles in recent years (Harrington, 2009):

2002	195,000 AF
2003	219,000 AF
2004	213,000 AF
2005	343,000 AF
2006	368,000 AF

LADWP also operates an extensive dust abatement project on the Owens Lake playa that relies heavily on shallow flooding to control dust. The dust abatement project currently uses about 68,000 acre-feet of water per year and may require up to 90,000 acre-feet.

The largest diversions from the West Walker River occur at the lower end of the state-boundary-defined watershed. In the northern portion of the Antelope Valley, water from the West Walker River is diverted into Topaz Reservoir, where it is stored for controlled release to irrigators downstream in Nevada. The Walker River Irrigation District created Topaz Lake by constructing a diversion and three-mile-long canal from the West Walker River into a small closed basin in 1921. A tunnel and canal release water back into the river on the Nevada side (California Department of Water Resources, 1992).

Within Antelope Valley, the West Walker River has been diverted into canals for local irrigation for more than a century. About 11 miles of the river are affected by these diversions, which can reduce the late-summer discharge to a series of marginally connected pools (Lahontan Regional Water Quality Control Board, 1975).

Upper and Lower Twin Lakes reservoirs on Robinson Creek were constructed around 1900 to regulate irrigation supplies for the Bridgeport Valley. The two reservoirs have a combined storage of 6,100 acre-feet and have water rights for refilling during the irrigation season. Bridgeport Reservoir was constructed in 1924 by the Walker River Irrigation District to store water for summer irrigation downstream in Smith and Mason Valleys. The reservoir has a storage capacity of about 44,000 acre-feet (California Department of Water Resources, 1992).

In the Mono basin, water from Mill Creek was diverted to generate hydroelectric power in the early years of the 20th century. The diversion to the Lundy powerhouse has a capacity of about 70 cfs. Regulation of the flows in Lee Vining Creek for hydroelectric generation began in 1921 (now FERC project 1388). Ellery, Tioga, and Saddlebag reservoirs in the headwaters of Lee Vining Creek have a combined storage capacity of 13,600 acre-feet. About 27,000 acre-feet of water pass through the powerhouse each year. Between 1916 and 1925, dams were constructed to enlarge Agnew and Gem lakes and at Rush Creek Meadows to form Waugh Lake to allow storage and regulation of water for the Rush Creek powerhouse near Silver Lake. Waugh, Gem, and Agnew reservoirs can store 4,980, 17,060, and 860 acre-feet, respectively, for Southern California Edison's FERC project 1389. There is a small dam on Walker Lake operated by LADWP that formerly was used to fill additional storage in May and was emptied in November. Due to extremely low flows that killed fish in Walker Creek below the dam during the May 2003 filling, the reservoir is now kept full year-round.

In the Mammoth Lakes basin, Lake Mary, Lake Mamie, and Twin Lakes are controlled by outlet structures, and their water levels change seasonally. The Mammoth Community Water District has appropriative water rights to 5 cfs or 2,760 acre-feet/year subject to State licenses and permit conditions and a Master Operating Agreement with the U.S. Forest Service.

During a period of great interest in small hydroelectric projects in the eastern Sierra Nevada in the late 1970s and 1980s, the Department of Fish and Game compiled statistics about the proportion of average discharge diverted in each stream and the stream length affected by the upstream diversion on each stream (Shumway, 1985). The following table illustrates the effects of diversion of some example streams within the upper Owens River watershed:

Table 3-9. Diversion effects on streams in the upper Owens River watershed

Stream	Average discharge (acre feet)	% Diverted	Length affected/total (miles)
Convict	18,600	29	7.0/7.1
Crooked	9,100	63	1.1/1.4
Hilton	8,130	17	1.4/4.4
Laurel	6,180	27	4.0/4.7
Mammoth	21,900	38	8.4/11.6
McGee	22,400	29	5.4/6.6
O'Harrel Cyn	72	3	0.5/3.0
Sherwin	4,700	<1	1.0/1.7

The Bishop Creek hydroelectric system diverts water from the south and middle forks of Bishop Creek and generates electricity at four powerhouses. The system began more than a century ago when the Nevada Power, Mining, and Milling Company began to transmit electricity from their Bishop Creek powerhouse to Tonopah in 1905. During the following eight years, the Nevada-California Power Company constructed dams that formed South Lake and Lake Sabrina and built five powerhouses that utilized more than 3,500 feet of head. The system is now operated by Southern California Edison under FERC license 1394. Lake Sabrina and South Lake have storage capacities of about 7,500 and 12,500 acre-feet, respectively.

Water suppliers

The following paragraphs describe a sample of the water suppliers in the region. Areas not otherwise mentioned have individual wells or other household supply or are served by mutual water companies with a small service population. The populations served by water systems within the planning area are summarized in Table 3-10.

Bridgeport Public Utilities District

The Bridgeport Public Utility District supplies water to the town (population 600) from two wells. In 1990, the total demand was about 243 acre-feet (California Department of Water Resources, 1992).

Lundy Mutual Water Company

The Mono City water system had 71 hookups as of August, 2005, served by a community well and storage tank. The water use is not currently metered, and there is no chlorination on a regular basis. Annual water use is about 27 acre-feet with about half of that lost to the atmosphere (USDA-Forest Service, 2003). A member of the Mono City water board mentioned at the August, 2000, Mono County planning commission meeting that the water system was "about maxed out."

Lee Vining Public Utility District

After World War II, the population of Lee Vining reached about 200, and the Lee Vining Public Utility District was formed. The district extended an existing supply pipe upstream above where there was any possibility of contamination from the Log Cabin Mine and built Mono County's first sewer system. The next upgrade was relocation of the intake to the forebay of the lower SCE powerhouse on Lee Vining Creek. In the 1950s, a 180,000-gallon storage tank was constructed on land provided by SCE and investigations began of a spring as an alternative to the creek water. After the spring was developed and connected to the Lee Vining supply system, the town's residents no longer suffered a seasonal ailment, locally known as the "Lee Vining pip," that was thought to result from lodgepole pine pollen in the water supply from the creek. The spring continues to serve Lee Vining and has been a reliable water source for a half century. A second storage tank was added about a decade ago in order to meet summertime peak hourly demand. The Lee Vining water system is routinely inspected and tested by technicians from the June Lake PUD. Lee Vining PUD began adding chlorine to its system a few years ago to meet state requirements.

June Lake Public Utility District

The June Lake Public Utility District serves the June Lake Loop area. The boundaries include an area of approximately 1,720 acres of unincorporated residential, commercial and undeveloped land. The district provides water to three distinct areas: the Village, West Village and Down Canyon, as well as the outlying areas of Pine Cliff, Oh! Ridge, and June Lake Junction. Water is obtained from Snow Creek, June Lake, Fern Creek, and Yost Creek (Boyle Engineering Corporation, 2004).

Initial construction of the Village water system, including the Snow Creek diversion facility, occurred in the 1940s. In 1972, an intake from June Lake was added, along with a filtration plant and storage tank. All of the water was drawn from June Lake between 1975 and 1978. After the Snow Creek diversion and filtration plant were completed in 1978, Snow Creek became the primary water source, and June Lake water was only used in summer months (Triad/Holmes Associates, 2004).

Water demand in the entire service area corresponds to the number of visitors to the area. The water needs of the permanent population (about 700) constitute a relatively small portion of the total water demand. The visitor population can exceed 3,000 persons on weekends and holidays (Boyle Engineering Corporation, 2004). The annual demand in 2004 was about 143 acre-feet in the Village system and about 225 acre-feet in the Down Canyon system (ECO:LOGIC Consulting Engineers, 2006).

If the proposed Rodeo Grounds development is built, that area could be densely populated with accommodations for as many as 7,000 visitors and permanent residents. Estimation of potential water demands for the development at buildout assumed the average day demand for visitors would be 75 gallons per capita per day (gpcd) and 100 gpcd for permanent residents. A more recent study estimated the total annual demand for the proposed project as about 33 million gallons or about 102 acre-feet (ECO:LOGIC Consulting Engineers, 2006).

Mammoth Community Water District

Beginning in 1958, the Mammoth County (now Community) Water District has supplied water and wastewater services to Mammoth Lakes. Until the mid-1970s, water diverted from Mammoth Creek was adequate to meet needs of up to 1,400 acre-feet/year. In 1978, the district obtained a permit from the State Water Resources Control Board to divert additional water. The permit includes several conditions that attempt to limit the impacts of the water diversion on the Mammoth Creek fishery. The District has also pursued groundwater well development, promotion of water conservation, system leakage repairs, and production of reclaimed water for irrigation. Although the resident population is currently about 8,000, instantaneous population on weekends and holidays often increases by up to four times for short periods. This high variability in demand is unusual among water supply utilities.

Total water use within the district was 2,565 acre-feet in 1992; 2,641 acre-feet in 1995; 3,287 acre-feet in 2001; and about 3,600 acre-feet in 2005 (Mammoth Community Water District, 2005). The District's most recent assessment determined that there was insufficient water from existing supplies to meet demands in dry years. The existing supplies and current use were quantified as 2,760 acre-feet from surface water and 4,000 acre-feet from groundwater. A study for the district estimated that a total volume of 3,800 acre-feet could be pumped from groundwater within the Mammoth Basin (generally within town boundaries) without significant impacts to streams or springs within the basin (Wildermuth Environmental, Inc., 2003).

Construction and operation of a reservoir, possibly at Horseshoe Lake, has often been proposed as an alternative for water management to provide carry-over storage of a greater portion of the snowmelt-runoff peak flows. However, cost and political considerations have limited the appeal of this option.

Communities of southern Mono County

The communities of Hilton Creek/Crowley Lake, Sunny Slopes, Pinyon Ranch, Paradise, and portions of Swall Meadows rely on groundwater supplied by community service districts or mutual water companies. In the Hilton Creek/Crowley Lake community, water use in 1980 was estimated at approximately 150 gallons per capita per day. Based on the average population figures for Crowley Lake, the estimated total domestic water use in the service area was about 50 AF per year in 1980 and was projected to be 110 AF per year in 1998 (Gram/Phillips Associates, 1980). Another estimate of typical water-use in the area is 440 gallons per day (gpd) for a single-family residence (Triad Engineering, 1994). The equivalent per capita rate is 125 gpd, assuming an average household of 3.5 people. During the summer irrigation season, daily demands typically approach 1,350 gpd per household or three times the annual average (Triad Engineering, 1994).

Three studies of groundwater resource availability in the Hilton Creek/Crowley Lake community were reported for the Mountain Meadows Mutual Water Company (Triad Engineering, 1994):

Slade and Blevins, 1979:	25-30 acre-feet/year
Gram/Phillips, 1981:	330 acre-feet/year
Kleinfelder, 1983:	407 acre-feet/year

The eventual water system demand has been estimated at 160 acre-feet/year (Triad Engineering, 1994).

In the past few years, one of the principal wells for the Hilton Creek/Crowley Lake community has been found to contain excessive levels of naturally-occurring radionucleides.

City of Bishop

The City of Bishop Department of Public Works supplies water to all residents and businesses within the city limits that enclose about 1.8 mi^2. The basic infrastructure consists of three wells, a million-gallon storage tank, disinfection facility, and pipelines. The average daily demand per capita over the period 1997 through 2006 varied between 390 and 490 gallons per day (Nolte Associates, 2008a).

Communities of southern Owens Valley

Water is supplied to Big Pine by the Big Pine Community Services District and Rolling Green Utilities, Inc. Inyo County currently supplies water to the communities of Laws, Independence, and Lone Pine, but a community services district structure is planned for these communities. The Cartago Mutual Water Company is the water supplier for Cartago.

The largest industrial water user in the Owens Valley is also a water exporter because its product is bottled water. The Crystal Geyser Roxane facility at Cartago on the west side of Owens dry lake pumps groundwater for bottling and has a design capacity of about 150 acre-feet per year (Quad Knopf, Inc., 2004).

Indian Wells Valley

In the largest population center of the Inyo-Mono IRWM region, the Indian Wells Valley Water District is the primary water supplier for the city of Ridgecrest. The District's domestic water system consists of 12 well pumping plants, 9 booster pumping plants, 10 water storage reservoirs, and more than one million linear feet of transmission and distribution pipelines (Krieger & Stewart 1998). Growth in the District's service area is forecast to increase from approximately 27,000 in 2000 to approximately 34,100 by 2020 (Indian Wells Valley Water District, 2002). Total groundwater pumping in the Indian Wells Valley by the District and other users is forecast to rise from 21,400 acre-feet per year in 2002 to about 22,900 acre-feet per year in 2020 (Couch, et al., 2003).

The Inyokern Community Services District serves approximately 420 households according to U.S. Census Bureau data for 2000. In 2001, the Inyokern Community Services District used 97 acre-feet/year of water. Water use has been steadily declining since the mid-1980s. This can be primarily attributed to reductions in the work force at NAWS China Lake.

Table 3-10: Mono, Inyo, and Kern County water systems in the Inyo-Mono IRWM planning region (source: Environmental Working Group: http://www.ewg.org/tap-water/home)

Mono County Water System	Population Served
Mammoth Community Water District	7,000
Bridgeport Public Utility District	600
Marine Corps housing at Coleville	360
June Lake PUD – Down Canyon	330
June Lake PUD – Village	308
USMC Mountain Warfare Training Center	250
Lee Vining PUD	250
Crowley Lake Public Utility District	250
Mountain Meadows Mutual Water Company	225
Lower Rock Creek Mutual Water Company	200
Crowley Lake Trailer Park	130
Birchim Community Services District	130
Mammoth Mountain Ski Area	100
Wheeler Crest Community Services District	80
Lundy Mutual Water Company	70
Camp Antelope	40
Whitmore Ballfields	30

Mono County Water System	Population Served
Crowley Lake Campground	25
McGee Mobile Home Park	20

Inyo County Water System	Population Served
City of Bishop	3,532
Highland Mobile Home Park	1,500
Lone Pine via Inyo County	1,118
Coso Junction Ranch Store	1,000[4]
Meadowcreek Mutual Water Company	934
Big Pine Community Services District	855
Rolling Green Utilities, Inc. Big Pine	800
Indian Creek Community Service District	750
Independence via Inyo County	586
Sierra Highland Community Services District	500
Pine Creek Village	350
Charles Brown Water Company	330
Glenwood Mobile Estates	300
Owens Valley Water Company	300
CDF Owens Valley Conservation Camp	250
Westridge Community Services District	245
Park West Mutual Water Company	200
Sierra Grande Estates Mutual Water Comp.	200
Keeler Community Services District	180
Starlite Community Services District	175
NPS Death Valley Cow Creek	150
NPS Death Valley Stovepipe Wells	150
Aberdeen Resort	150
Brookside Mobile Home Park	136
Cartago Mutual Water Company	132

[4] Number is only an estimate and is likely not accurate.

Inyo County Water System	Population Served
Wilson Circle Mutual Water Company	100
Foothill Lone Pine Mobile Home Park, LLC	100
Rawson Creek Mutual Water Company	100
Valley Vista Mutual Water Company	75
North Lone Pine Water District	70
Ranch Road Estates Mutual Water Company	65
Darwin Community Services District	60
Aspendell Mutual Water Company	60
Brookside Estates Mutual Water Company	45
Sunland Village Mobile Home Park	42
Keough Hot Springs	40
SCE Bishop Creek Plant 4	38
Control Gorge Power Plant	36
Primrose Lane Apartments	36
Meadow Lake Apartments	35
Olancha RV Park	30
Sierra North Community Services District	28
Rocking K Estates Mutual Water Company	27
Mountain View Trailer Court	25
NPS Death Valley Grapevine Ranger Station	11

Kern County Water System	Population Served
Indian Wells Valley Water District	34,900
Naval Air Weapons Station China Lake	9,500
Inyokern CSD	970
East Inyokern Mutual Water	87

Urban runoff and stormwater management

Concerns about pollution from stormwater runoff from urban areas began to be raised in the 1950s and 1960s. The principal pollutants that can be expected in urban runoff include sediment, oils and grease, rubber compounds, nutrients, pesticides, bacteria and viruses, and metals. The materials that are likely to be found on streets, gutters, and parking lots typically get removed in the first flush of stormwater runoff. The concentration of these pollutants usually depends on the time since the previous storm, and intensity and amount of rainfall. The efficiency of the gutter and storm sewer system can greatly affect the size and timing of peak flows collected by the system.

Mammoth Lakes is the only community Mono County with an engineered stormwater collection system. In 1984, only a few parts of the community of Mammoth Lakes had storm drains. Most of the town was drained by a combination of natural and constructed surface channels, which led to a variety of drainage problems (Brown and Caldwell, 1984). Up until the late 1980s, much of the runoff from the developed area flowed as sheet-flow to roads or flowed in unimproved channels or ditches to topographically lower channels. In 1976, a storm drain system was constructed for a portion of the town, which eventually discharged directly to Murphy Gulch (Brown and Caldwell, 1984).

In association with the Main Street storm drain, a 260,000 ft^3 siltation basin was constructed at the downstream end of the Murphy Gulch channel, approximately 1/4 mile above its junction with Mammoth Creek. Although the basin trapped a significant volume of silt and sediment each year, there was evidence that it did not capture enough of the sediment input. During peak runoff, sediment deposition efficiencies are drastically reduced (due to high flow-through velocities) resulting in visibly turbid effluent discharges. The old earth-fill dam was in relatively poor condition as of 1984, and there were signs of seepage on its downstream face (Brown and Caldwell, 1984).

The drainage master plan proposed by Brown and Caldwell (1984) included construction of new storm sewers, capture of runoff that formerly went directly into Mammoth Creek, detention storage of runoff, additional local sediment retention basins, and reconstruction of the sediment retention basin in Murphy Gulch. The estimated capital cost was $18 million, and annual operating costs were estimated at $100,000 to $250,000 (Brown and Caldwell, 1984). In the early 1980s, about 1,600 acres of the town of Mammoth Lakes' area of four square miles (about 60 percent) were considered to be impervious (Environmental Sciences Associates, 1984).

Wastewater treatment and disposal

The cities, towns, and larger communities of the planning region have wastewater collection and treatment systems while smaller communities and isolated homes do not. In the north, residences and businesses in Coleville and Walker rely on septic tanks and leach fields for sewage disposal. There are concerns about effectiveness of some of these systems in areas with high water tables. The USMC Mountain Warfare Training Center has a 100,000 GPD package waste treatment plant and leach fields (Mono County, 1992).

The Lee Vining Public Utility District sewage system includes the main part of town, but not the SCE plant, the Mobil station or the Pumice Plant. Waste enters into a large community septic tank, which is pumped periodically. The effluent passes through the septic tank into sewage ponds located below the community center. Mono City, Conway Ranch, Lundy Canyon, and other scattered homes are on individual septic systems.

The June Lake Public Utility District provides sewerage service to three major service areas: June Lake Village, Down Canyon, and the U.S. Forest Service's Silver Lake Tract. Additional service is provided by contract to campgrounds and several parking facilities along the June Lake Loop (Boyle Engineering Corporation, 2005). Between 1995 and 2003, daily flow at the treatment plant ranged from 0.16 to 0.4 mgd with an average of 0.25 mgd. Based on an average daily water demand of 0.34 mgd, about three-quarters of the supplied water is returned to the sewer system. The remainder is presumably used for landscape irrigation. Average monthly flows ranged from 5.1 million gallons to 10.5 million gallons with an average of 7.6 million gallons. The projected average daily wastewater flow at buildout of the service area is 0.66 mgd (Boyle Engineering Corporation, 2005).

The primary wastewater treatment facility within the upper Owens River watershed serves the town of Mammoth Lakes and is operated by the Mammoth Community Water District. An average of 1,500 acre-feet of water was treated at the facility between 1983 and 1997 (Bauer Environmental Services, 1998). The disinfected secondary-treated effluent from the facility is piped several miles to the Laurel Ponds where it is discharged. The treated water percolates into the ground at this location or evaporates. The expansion of Laurel Ponds to more than 18 acres of surface area has been considered a benefit for waterfowl habitat by the Inyo National Forest, which administers the site. The Mammoth Community Water District recently completed a project to treat the wastewater to Title 22 standards unrestricted irrigation use and began delivering reclaimed water to one of two local golf courses in 2010. The Mammoth Lakes wastewater treatment plant is a permitted wastewater facility as are the treatment plants of the Hilton Creek Community Services District, Mammoth Mountain Ski Area, and Convict Lake campground.

In the mid-1970s, the community of Hilton Creek/Crowley Lake had an estimated average population of 300 and was served entirely by individual disposal systems consisting primarily of septic tanks and leach fields or leach pits. Because of the presence of adverse soil and groundwater conditions, these individual systems had abnormally high failure rates for many years. Many of the disposal systems were located less than 100 feet from surface waters or in areas of shallow groundwater. Percolation rates throughout the community area are quite high, which is typical for glacial outwash soils. About two-thirds of the residences and at least five commercial establishments in the community obtained their domestic water supplies from the direct diversion of the surface waters of Hilton Creek. Mono County health officials were aware of problems from at least 1966. A study prepared by the Lahontan RWQCB for the county in that year reported alarming coliform concentrations at sample points in natural surface streams as well as in private water supply systems. The report attributed the majority of this contamination to the use and misuse of septic tank / leach field sewage disposal systems. Water quality sampling and public health investigations in the vicinity of Hilton Creek indicated that the continued use of individual disposal systems posed significant health hazards and adverse water quality impacts. Mono County and the Lahontan RWQCB both adopted restrictions and prohibitions on the installation of new septic tank / leach field disposal systems within the Hilton Creek service area in 1976. The Lahontan RWQCB further prohibited use of existing disposal methods after January 1, 1985 and recommended that a community sewerage system be implemented for the area (Gram/Phillips, 1977).

The communities of southern and eastern Mono County rely on septic tanks and leach fields for sewage disposal as do most of the smaller communities of Inyo County.

The City of Bishop Public Works Department provides sewer service to the central portion of Bishop. A gravity collection system routes sewage to the wastewater treatment plant east of town. The plant processes about 800,000 gallons per day and has a capacity of 1.6 million gallons per day. Average wastewater flow is forecast to be 4.7 million gallons per day if Bishop was fully built out, including lands currently owned by the Los Angeles Department of Water and Power within the city limits (Nolte Associates, 2008b). One week per month, the City's wastewater treatment plant also treats sewage from the Eastern Sierra Community Services District, which operates its own treatment plant the other three weeks per month.

Other agencies that provide wastewater collection, treatment, and disposal services in Inyo County include Big Pine Community Services District, East Independence Sanitary District, Lone Pine Community Services District, and Inyo County.

The City of Ridgecrest's wastewater treatment system collects, processes, and disposes domestic wastewater from the city of Ridgecrest and the Naval Air Weapons Station at China Lake. The treatment facility has a design capacity of 3.6 million gallons per day and was treating an average of 2.6 million gallons per day in 2000 or about 2,900 acre-feet per year. About one-third of the effluent evaporates and the remainder percolates to groundwater. As of 2010, a proposed solar electricity generating facility was pursuing use of the treated effluent as a coolant.

Description of water quality

Compared to most of California, water throughout most of the Inyo-Mono IRWM planning area is of very high quality, simply because of the small population and high proportion of public lands. There are not many opportunities for contamination compared to parts of the state with high population, industries, and intense land uses. Many of the identified water-quality issues result from naturally-occurring minerals.
The Lahontan RWQCB water body fact sheet for the West Walker River lists sedimentation, agricultural drainage, and water diversions as the primary water-quality problems in the West Walker River. The State of Nevada considers the water crossing the state line to not support beneficial uses because of excessive nutrient load.

The Lahontan Basin Plan of 1975 characterizes the waters of the Mono Basin as generally excellent in quality, with total dissolved solids (TDS) levels of less than 50 parts per million (ppm) in surface water and less than 100 ppm in groundwater. Surface water is ionically dominated by calcium carbonate and classified as soft. Heavy metal concentrations are below detectable limits or only present in trace amounts. Dissolved oxygen is at or near saturation. Coliform bacteria are below detectable limits in groundwater; surface waters were not analyzed for bacteria (Triad Engineering, 1987). Independent sampling by Lee (1969) in several Mono Basin streams including Mill and Wilson creeks found that the waters were calcium bicarbonate type and had TDS ranging from 31 to 81 ppm.

Water quality in the major tributaries (Lee Vining, Walker, Parker, and Rush creeks) is typical of eastern Sierra Nevada snowmelt runoff streams. This area is largely undeveloped and undisturbed above the LADWP diversion structures, except for recreation-residential developments near June Lake and on Rush and Walker creeks and recreational facilities on Lee Vining Creek and Mill Creek. Natural weathering and erosion processes are the main factors affecting water quality in these streams. A seasonal difference in quality between groundwater-fed baseflow and snowmelt runoff has been measured (Jones and Stokes Associates, 1993b).

The upper Owens River watershed is used as a water source for export to the city of Los Angeles. Although geologic sources contribute phosphates, arsenic, and other minerals to the water, the overall quality is still excellent and quite suitable for human consumption at its urban destination.

The first Basin Plan for the Lahontan Region (Lahontan RWQCB, 1975) mentioned that analyses of water entering Crowley Lake found excellent quality for constituents measured except for arsenic, which sometimes exceeds federal drinking water standards. Most environmental documents relating to parts of the watershed routinely cite excellent water quality in the area's streams that is suitable for all beneficial uses. The principal exception is Mammoth Creek within and downstream of the town of Mammoth Lakes.

A major assessment of surface water quality in the Mammoth Creek watershed was conducted by a team of graduate students and faculty from UCLA in the summer of 1972 (Perrine, et al., 1973). This study judged the overall surface water quality to be excellent with respect to chemical constituents. One exception to the low chemical concentrations was relatively high concentrations of phosphorus that could contribute to excessive growth of aquatic plants, although natural sources were believed responsible. Fecal coliform bacteria counts in lower Mammoth Creek were high and believed to result from leaching from campground pit toilets in the Lakes Basin, septic systems in Old Mammoth, and pet waste. This study was conducted before the connection of the campgrounds and many of the houses in Old Mammoth to the sewer system. Several of the groundwater production wells in the Mammoth Lakes basin contain unsafe levels of arsenic that become problematic when water supplies are heavily dependent on groundwater contributions.

Over the entire Inyo National Forest (lands in the upper Owens River watershed are not distinguished separately), 97 percent of the water flowing off the forest was judged to meet water quality objectives as of 1988. The remaining 3 percent contained excessive sediment (USDA-Forest Service, 1988a).

Water samples from various tributaries to the Owens River have been analyzed by LADWP since the 1930s and 1940s. During the Mono Basin Environmental Impact Report process, these data were summarized along with a special water quality survey in 1991 by Jones and Stokes Associates (1993b). All except Hot Creek had low concentrations of minerals and nutrients.

Every two years, the State Water Resources Control Board submits a report on the quality of streams and lakes in California to the U.S. Environmental Protection Agency. Part of that report refers to section 303(d) of the federal Clean Water Act, which directs the states to identify priority water quality issues in individual water bodies. The following water bodies in the Inyo-Mono IRWM region were on the 2006 list:

Table 3-11. Water bodies in the Inyo-Mono planning region on the 2006 impaired water bodies list from SWRCB.

Name	Pollutant
Bodie Creek	Mercury
Bridgeport Reservoir	Nitrogen, phosphorus
Crowley Lake	Ammonia, dissolved oxygen
East Walker River	Pathogens, nitrogen, phosphorus
Haiwee Reservoir	Copper
Mammoth Creek	Mercury, metals
Robinson Creek	Pathogens
Swauger Creek	Pathogens, phosphorus
Twin Lakes	Nitrogen, phosphorus

Constituents: measurements and biological indicators

Systematic sampling of water quality parameters has not occurred in the Inyo-Mono IRWM planning area. Therefore, our knowledge about region-wide water quality is based on irregular reporting of isolated sampling and analysis done sporadically over the past few decades.

Sediment

The Environmental Impact Statement for the Land and Resource Management Plan ("Forest Plan") of the Inyo National Forest (USDA-Forest Service, 1988a:315) states that the "primary threat to water quality on the Inyo is sedimentation." The document indicates that the most significant sources of sediment are the ski areas and rangelands, particularly wet meadows, disturbed by historic overgrazing. In a subsequent section on cumulative effects that also addresses sources on private land, the Forest Plan states that suspended sediment in Mammoth Creek during spring-summer runoff increases ten-fold between the outlet of Twin Lakes and U.S. Highway 395.

Measurements of suspended sediment, turbidity, or bed load are not known to have been made within the Mono Basin until the past few years. A study of sediment budgets (R2 Resource Consultants, 2000) estimated about 13 acre-feet of sediment supply per year for Lee Vining Creek (range 3.0-2,770), about 0.9 acre-feet for Walker Creek (range 0.2-40), and about 3.8 acre-feet per year for Parker Creek (range 0.8-35). The various dams across Rush, Lee Vining, and Mill creeks have retained most of the sediment produced in the headwater areas and have increased channel scour below the dams to an unknown extent.

The June Mountain Ski Area was reported to produce "considerable sediment during peak runoff periods, causing a shutdown of water treatment systems for 30 days or more each year. Implementation of the [erosion prevention program] for the ski area has reduced these impacts over the past few years, and discharge will soon meet state requirements" (USDA-Forest Service, 1988).

The Inyo National Forest (1988b) has noted a significant increase in sediment and turbidity levels during peak runoff events in Mammoth Creek. These increases appear to be the result of disturbances in the developed area and the sensitivity of the local soils to disturbance. The impact of runoff from urban development is reflected in the increase in sediment and turbidity levels in Mammoth Creek as it flows through the town. Based on USFS data developed on Mammoth Creek at U.S. Highway 395, from October 1981 to September 1982, the total annual sediment discharge is estimated to be 5,100 tons or approximately 0.20 ton/acre of watershed. This sediment yield is one-third of the average for the Sierra Nevada (0.75 ton/acre) and one-tenth of the average for California (2 ton/acre) (Kattelmann, 1996).

Minerals

The limited water quality data suggest that the mineral content of the Mono Lake tributaries is very low and similar to other high quality Sierra Nevada streams. Concentrations of all minerals that were measured were low enough to rate as excellent drinking water quality (Jones and Stokes Associates, 1993b).

Total dissolved solids (TDS) were measured in samples collected from Mammoth Creek and some of the lakes in the Lakes Basin during the summer of 1972 by the UCLA team and found to be generally less than 50 mg/l, with a couple of samples around 100 mg/l (Perrine, et al., 1973). Drinking water standards are about 500 mg/l for comparison. Measured concentrations of sodium, calcium, and magnesium were less than 10 mg/l. The Mammoth Community Water District has measured water from Lake Mary for various constituents since 1983. Values for TDS over this period have ranged from 10 to 50 mg/l with a mean of 31 mg/l.

Conductivity is often used as a proxy for TDS because it is relatively easy to measure. Specific conductance of water released from Grant Lake reservoir has been monitored by LADWP since 1934 and has ranged from 40 µS/cm to 100 µS/cm with an average of about 60 µS/cm (Jones and Stokes Associates, 1993b). Specific conductance was also measured for many years in Lee Vining Creek and found to range between 25 and 75 µS/cm.

Table 3-12. Spot measurements of conductivity made in various portions of the upper Owens River watershed during October 1985 by the Department of Fish and Game (Deinstadt, et al., 1986)

Waterway	**Conductivity (µS/cm)**
Owens River	120, 130, 120, 170
Rock Creek	20, 25, 30, 20, 8
McGee Creek	40, 75, 70
Mammoth Creek	77, 85, 128, 108, 115, 35
Hot Creek	580
Laurel Creek	50
Sherwin Creek	20
Glass Creek	30

Table 3-13. Conductivity measurements by LADWP and Jones and Stokes Associates (1993b)

Waterway	Conductivity (µS/cm)
Owens River at Big Springs	166-223
Owens River at Benton Crossing	295-560
Mammoth Creek	50-200
Hot Creek	200-650
Convict Creek	125-175
McGee Creek	56-175
Hilton Creek	24-62
Crooked Creek (1991 only)	43-128
Rock Creek	25-125

Nutrients

Nutrient loading is a major issue in the East Walker River basin. Bridgeport Reservoir is eutrophic and is afflicted with blooms of blue-green algae each summer. The Bridgeport Valley upstream of the reservoir is extensively grazed from June through September. Phosphorus and pathogen concentrations in tributaries to Bridgeport Reservoir, measured in April-June 2000, increased significantly downstream of pastures (Horne, et al., 2003). However, biochemical processes in the wet soils of the pastures are converting and capturing most of the applied nitrogen (Horne, et al., 2003).

Limited sampling suggests very low concentrations of nutrients in streams of the Mono basin. The 1991 sampling of Grant Lake found only minimal concentrations of nitrogen and phosphorus, both in the lake and the outlet. Chlorophyll *a* values in Grant Lake reservoir ranged from 0.9 to 13.3 µg/l, with an average of 5.8 µg/l, indicating low nutrient status and consequent low biological productivity (Jones and Stokes Associates, 1993b).

A mix of historic water quality results reported by the Los Angeles Department of Water and Power (1984) included measurements of nitrate that ranged from 0 (below detection) to 2 mg/l. Besides that one value of 2 mg/l, all other reported values were 0.4 mg/l or less.

In June Lake, nutrient concentrations from limited sampling were quite low with combined nitrate plus nitrite concentrations below detection in three samples and 0.02 mg/l in a fourth sample. Ammonia was 0.03 mg/l or less. Orthophosphate was not detected, and total phosphorus concentrations were 0.02 mg/l or less (Brown, 1979). This study found that although nitrate plus nitrite was below detection limits in Gull Lake, concentrations of ammonia and orthophosphate were relatively high: up to 0.54 and 0.16 mg/l, respectively. Both nutrients were believed to be derived from anaerobic decomposition of algae and other organic matter in the near-bottom layers of the lake (Brown, 1979). The study hypothesized that nutrients released from the surrounding homes prior to the sewer system might contribute to the high fertility of Gull Lake (Brown, 1979).

In Silver Lake, nutrient concentrations were below detection limits except for total phosphorus concentrations of 0.01 and 0.02 in two samples. The study judged that there was a minor enrichment of Silver Lake from nutrients contributed by Gull Lake via Reversed Creek (Brown, 1979).

The 1994 samples from Rush Creek above Grant Lake (USGS station 10287400) and the Rush Creek power plant tailrace (USGS station 10287300) had the following results (concentrations in mg/L):

Total nitrogen: < 0.05
Ammonia: 0.01-0.02
Phosphorus: <0.01-0.02
Orthophosphate: <0.01

The nutrient budget of Crowley Lake has received greater attention than other parts of the Inyo-Mono IRWM planning area because of the eutrophic state of the lake. Almost all (96 percent) of the observed phosphorus loading to Crowley Lake comes from the Owens River, which only provides about half of the water input to the lake (Jellison and Dawson, 2003). The known sources for this phosphorus are Big Springs and numerous sites along Hot Creek.

The Owens River accounts for 79 percent of the nitrogen input to Crowley Lake and McGee Creek accounts for 13 percent (Jellison and Dawson, 2003). Ammonia, nitrate, and total nitrogen concentrations are relatively low in all other tributaries. Total nitrogen concentrations increased somewhat across the irrigated pastures of Convict and McGee creeks. This increase is about 6 percent of total nitrogen loading to Crowley Lake. Hot Creek fish hatchery contributes a significant amount of ammonia and total nitrogen to Hot Creek. The communities of Mammoth Lakes, McGee Creek, and Hilton Creek had little apparent effect on nutrient concentrations downstream (Jellison and Dawson, 2003). Three to four times more nitrogen leaves Crowley Lake than enters it, presumably because of nitrogen-fixing cyanobacteria (blue-green algae) in the lake.

Nitrate concentrations were measured in Mammoth Creek in the summer of 1972 by the UCLA team and were less than 0.5 mg/l in 99 percent of the samples (Perrine, et al., 1973). Phosphate concentrations were generally less than 0.1 mg/l, although a few samples were up to 0.3 mg/l.

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.

Metals

Mercury has been a concern in the Walker River basin after elevated concentrations of mercury were found in tui chub and common loons at Walker Lake. Recent sampling of water, sediment, and aquatic invertebrates suggests that the primary source areas are associated with the Bodie and Aurora mining districts in the Rough Creek watershed, which is part of the East Walker basin. Samples from the West Walker River had total mercury concentrations within the range of natural background amounts: 0.62 ng/L in the water and 8 to 44 ng/g in the sediment (Seiler, et al., 2004). By contrast, the East Walker River above the confluence with the West Walker had a total mercury concentration of about 60 ng/L in the water and more than 1,000 ng/g in the sediment. The greatest total-mercury concentration in sediment was found in the bed of Bodie Creek at 13,600 ng/g (Seiler, et al., 2004). The absence of major mining and milling operations in the West Walker watershed appears to have minimized mercury contamination in marked contrast to the adjacent Carson and East Walker rivers.

Trace element concentrations were frequently undetectable or very low in water at the Grant Lake reservoir outlet, but lead, zinc and boron were found in sediments in concentrations slightly higher than background (Jones and Stokes Associates, 1993b).

The 1994 samples from Rush Creek above Grant Lake (USGS station 10287400) found concentrations of boron between 10 and 20 mg/L, concentrations of iron between 12 and 24 mg/L, and concentration of manganese between 3 and 11 mg/L.

Metals, primarily arsenic and mercury, have been measured in the Crowley Lake water column and sediments (Lahontan RWQCB, 1994). These substances are believed to originate from natural sources resulting from the particular chemical composition of the watershed's geology. Arsenic concentrations high enough to be a health concern for fish and humans have been measured in the upper Owens River below the confluence of Hot Creek as well as in Hot Creek itself (Ebasco Environmental, et al., 1993). A detailed study of arsenic in Crowley Lake waters confirmed the geologic nature of the sources (Jellison, et al., 2003).

When the level of Crowley Lake fell rapidly in 1989, tributary streams eroded new channels in their deltas in response to the dropping base level. Large volumes of sediments were transported into deeper areas of the lake. Stirring up these sediment deposits also released mercury that had been in storage, and elevated mercury levels were found in water samples collected by LADWP at the dam in February 1990 (Milliron, 1997). Subsequent analyses of trout tissue found no detectable levels of mercury or other heavy metals (Milliron, 1997).

Organics

In 1999, the June Lake Public Utility District tested all its water systems for various organic chemicals. Dichloromethane, an insecticide and industrial by-product, was detected in water from June Lake and Snow Creek in one sampling but not found again in follow-up tests (Boyle

Engineering Corporation, 2004). No other records of analyses of organic contaminants for the Mono Basin were located.

Fuel spills from crashes of tanker trucks have contaminated Slinkard Creek and the East Walker River in recent years. Major clean-up operations were performed in both cases. Fuel spills may have occurred within the June Mountain Ski Area during slope grooming operations.

Monitoring wells at the Benton Crossing landfill have detected low concentrations (about one or two parts per billion) of three volatile organic compounds (Mono County Planning Department, 2004). Although the concentrations appear to be stable and well below the so-called maximum contaminant levels, a monitoring program reports results from sampling and analysis to the Lahontan Regional Water Quality Control Board.

Temperature

Temperatures of stream water are determined by the source of water (direct snowmelt runoff, overland flow, and seepage from soil and groundwater) and energy inputs (primarily solar radiation). Shading of the stream by terrain features and vegetation regulates the amount of solar energy received by the water. The volume of flow is also critical because a given amount of energy can raise the temperature of a large volume of water only a small amount but can raise the temperature of a small volume perhaps several degrees.

Herbst and Kane (2004) found that summer stream temperatures rarely exceeded 59°F in the control streams of their study within the West Walker River watershed. Summer temperatures of some of their treatment streams that had comparatively little riparian vegetation were well above 59°F. Maximum temperatures in their Poore Creek site exceeded 80°F in 2002.

Water temperature in the streams of the Mono Basin has been altered by water management activities. Water is stored in several reservoirs in the Mono Basin where the timing of the releases affects the volume of water in the stream, and the depth of the outlet determines whether warm surface water or deeper cool water enters the stream below the dam. The diversions for export greatly reduced flow and consequently raised temperatures below the diversions. Flow reductions also decreased the amount of riparian vegetation that provided shade to the streams.

Water temperatures were monitored at four locations on the upper Owens River between June 1 and September 30, 1991 (Ebasco Environmental, et al., 1993). The average temperatures, as well as the variation in daily temperature values, tended to increase downstream. Daily average temperatures ranged from 52°F to 65°F at the powerline crossing above Hot Creek and from 56°F to 72°F at Benton Crossing. Maximum temperatures ranged up to 80°F (Ebasco Environmental, et al., 1993).

Water temperatures in upper Mammoth Creek were measured during the summer of 1972 and found to be in the range of 54°F to 75°F and did not exceed 82°F. The daily temperature range varied within 2°F to 10°F (Perrine, et al., 1973).

Water temperatures in Hot Creek and Convict Creek apparently rise several degrees where warm irrigation return flow enters the creeks following flood irrigation of adjacent pastures.

Dissolved oxygen

Limited sampling above and below Topaz Reservoir suggested that stratification of the stored water behind the dam results in less dissolved oxygen downstream of the reservoir than is present in the West Walker River upstream (Humberstone, 1999).

June Lake mixes twice a year, usually in May and October. In summer and winter, June Lake is stratified with dissolved oxygen near saturation (and therefore favorable to trout) only at middle depths during summer (Brown, 1979). Decomposition of organic matter, mainly algae, depletes the oxygen below about 50 feet in June Lake. In Gull Lake, dissolved oxygen was not present below 40 feet, and the lake was judged to be eutrophic with excessive algal productivity. Dissolved oxygen in Silver Lake was near saturation except for some depletion noted in a 1979 sample (Brown, 1979).

Dissolved oxygen levels in upper Mammoth Creek were measured in the summer of 1972 by the UCLA team and found to be 6 to 8 mg/l, a range quite suitable for trout and close to theoretical saturation at the ambient temperatures of the streams and lakes (Perrine, et al., 1973). This study also found biochemical oxygen demand in Mammoth Creek was quite low, almost always below 2 mg/l.

Dissolved oxygen was measured in Crowley Lake during August 1993 (when the lake was stratified) by the Department of Fish and Game. Below a depth of 33 to 43 feet, dissolved oxygen was only 2 mg/l (Milliron, 1997). Concentrations of dissolved oxygen between 3 to 5 mg/l restrict growth of trout, and levels below 3 mg/l can be lethal to trout after long exposure (Milliron, 1997).

Pathogens

The UCLA team measured concentrations of total coliform and fecal coliform bacteria in water samples from Mammoth Creek and lakes in the Lakes Basin during the summer of 1972. This study found a wide range of variability from 0 to 10,000 colonies per 100 ml for total coliform and 0 to 1,000 colonies per 100 ml for fecal coliform (Perrine, et al., 1973). Naturally occurring soil bacteria were believed to be the main constituent of the total coliform counts. The highest fecal coliform counts were found in lower Mammoth Creek and believed to result mainly from leaking septic systems in Old Mammoth and pet waste.

Most sites sampled by Setmire (1984) in upper Mammoth Creek had fecal coliform bacteria counts below 10 colonies per 100 ml. Mammoth Creek at U.S. Highway 395 had 250 colonies per 100 ml, and Hot Creek below the hatchery had more than 1,000 colonies per 100 ml (Setmire, 1984).

There have been anecdotal reports of bacterial contamination of the small channels over the Hilton Creek fan (Hilton Creek distributaries) by neighboring outhouses and septic systems. For example, a routine water sample within the Crowley Lake Mutual Water Company system tested positive for fecal coliform in November, 2002 (Mammoth Times, 2002).

pH and alkalinity

The pH of water is an index of the hydrogen ion concentration, which in turn causes water to be acidic or alkaline. A pH value of 7 is neutral, values less than 7 (increasing hydrogen ion concentration) are acidic, and values greater than 7 [to a maximum of 14] (decreasing hydrogen ion concentration) are alkaline. Lakes in the upper Owens River watershed had pH values averaging about 8.3 in an early survey (Smith and Needham, 1934). Slightly alkaline waters such as these lakes tend to have more plants and animals than neutral or acidic waters.

Alkalinity is a measure of the capacity of water to buffer changes in hydrogen ion concentration. Water with greater alkalinity is more resistant to changes in pH. Alkalinity depends on the amount of carbonate, bicarbonate, and hydroxide ions.

A study of Crystal Lake relating to acidic precipitation found that the pH of the lake was 6.7 to 6.1 and the acid-neutralizing capacity varied from 56 to 82 microequivalents per liter (µeq/l). Acid-neutralizing capacity declined rapidly during the snowmelt season as very pure runoff water entered the lake, and then slowly increased during the remainder of the year (Melack, et al., 1993).

Water imported from the Mono Basin lowered the alkalinity of the upper Owens River and consequently might have had some potential effects on the toxicity of naturally occurring metals.

Groundwater quality

Boron, fluoride, and arsenic have been found in water from artesian wells near the center of Antelope Valley. Among five wells sampled in Antelope Valley, one had a concentration above a Maximum Contaminant Level for inorganics-primary, and two had a concentration above a Maximum Contaminant Level for radiological (California Department of Water Resources, 2004).

Occasional measurements of samples from wells and springs have been made over the years. For the Mammoth Creek watershed, the California Department of Water Resources (1973) reports TDS and electrical conductivity for several dozen wells and springs. TDS values ranged from 30 to 300 mg/l for cold water sources and 500 to 1,600 mg/l for geothermal sources. Electrical conductivity ranged from 60 to 400 micromhos/cm for cold water sources and between

500 and 2,300 for geothermal sources.

Water issuing from the Mammoth Mine adit had a TDS concentration of 95 mg/l and a spring near the YMCA camp had an electrical conductivity of 50 micromhos/cm (California Department of Water Resources, 1973).

Some of the groundwater pumped by MCWD contains arsenic. After blending with surface water (which does not contain detectable arsenic), the average arsenic concentration in MCWD supplies is below the maximum contaminant levels (MCL). In 2009, MCWD conducted a public notification in April 2009 when arsenic MCLs were exceeded. In 2009, the average arsenic level was 8.9 parts per billion, with a range of 0 to 33 ppb (MCWD 2010). The drinking water standard for arsenic was changed from 50 ppb to 10 ppb in January 2006. MCWD has been working with a consultant to determine options for consistently removing arsenic from the potable supply.

In recent years, the presence of uranium compounds at concentrations above drinking water standards has been identified in some community water supplies and private wells within the region. Trace amounts of uranium occur in some of the geological substrates of the area, and local groundwater partially reflects the chemical composition of materials in contact with the water. The extent and severity of the issue is uncertain as of 2010. The Environmental Health Department of the County of Mono is monitoring the situation. The next iteration of this plan should contain additional details.

Groundwater in the vicinity of the Benton Crossing landfill is monitored with a series of wells to detect any changes in groundwater quality resulting from materials leaching out of the landfill.

As of 1998, there were 12 known cases of leaking underground storage tanks (presumably gasoline or other volatile fuels) within the upper Owens watershed (Lahontan Regional Water Quality Control Board, 1998). A large gasoline spill occurred at the Mammoth Mountain garage facility on January 12, 1999 (Buckmelter, 2000). Approximately 7,500 gallons of gasoline entered the soil, and about a quarter of that amount was recovered within the first few months after the spill. A series of monitoring wells was installed to observe the plume within the groundwater.

Some overly generalized information on groundwater quality for Long Valley between 1994 and 2003 was tabulated in a recent report of the California Department of Water Resources (2004). Two of six public supply wells tested in Long Valley exceeded the maximum contaminant levels for radiological contaminants. All four of the public supply wells tested in Long Valley exceeded the maximum contaminant level for some inorganic secondary contaminant (chloride, copper, iron, manganese, silver, specific conductance, sulfate, total dissolved solids, or zinc).

In recent years, one of the wells supplying water to the Mountain Meadows Mutual Water Company for part of the Hilton Creek/Crowley Lake community has had concentrations of uranium sufficiently high to be a matter of concern.

Natural sources of constituents

Big Springs and Deadman Creek provide natural sources of phosphorus, which encourages abundant growth of aquatic plants in the upper Owens River and in Crowley Lake. Big Springs was found to be the primary source of phosphorus for Crowley Lake (Melack and Lesack, 1982). Hot Creek is the largest tributary to the upper Owens River and contributes additional nutrients as well as some heavy metals. Arsenic is found at high levels in some of the Hot Creek geothermal springs within the creek (Ebasco Environmental, et al., 1993).

Anthropogenic sources of constituents

A water quality modeling study demonstrated that reducing diversions from the West Walker River would improve water quality in the river as well as Walker River, largely by providing additional water for dilution of dissolved salts (Humberstone, 1999).

A recent study in the Bridgeport Valley (Elkins, 2002) may provide some indications about nutrient and fecal coliform pollution from livestock operations. Elkins (2002) found that:

1) more than half of the annual nitrogen and phosphorus loads to Bridgeport Reservoir were delivered by snowmelt runoff,
2) total inorganic nitrogen (nitrate and ammonia) was removed by biochemical processes in the saturated soils of the Bridgeport Valley,
3) water that remained in the channels and was not in contact with the soils retained any inorganic nitrogen already present,
4) dissolved organic nitrogen was the primary form of nitrogen entering Bridgeport Reservoir and was readily leached from manure and irrigated soils,
5) phosphorus was not retained by the soils and was readily transported on eroded soil particles,
6) fecal coliform from livestock manure appears to survive for months even in the cold temperatures of Bridgeport Valley and is readily transported in snowmelt runoff and irrigation return flow.

Unpaved roads are the principal source of sediments from human activities throughout the Sierra Nevada (Kattelmann, 1996). That situation is likely to be the case within the Inyo-Mono IRWM planning area as well, although grading for residential construction may be the main source in local areas, such as the town of Mammoth Lakes. Activities that remove vegetation and leaf litter, expose soil directly to rainfall and runoff, and compact soil greatly increase the potential for erosion. If the disturbance is near a stream channel, then there is a high likelihood that the eroded sediment will be transported into a stream rather than just relocated. The Mammoth Mountain Ski Area was also identified as a major source of human-caused sediment (USDA-Forest Service, 1988a). However, erosion control efforts and sediment detention basins have presumably greatly reduced the amount of sediment leaving the ski area boundaries.

A variety of petroleum- and rubber-based materials are washed off paved roads into storm sewers and small channels.

Nitrogen and phosphorus enter streams from several sources: leakage and failure of septic and sewage systems; overapplication of fertilizers on lawns, gardens, golf courses, and ski runs; release of some household cleaning products; and pet waste.

Pathogenic bacteria, such as *E. coli*, enter surface waters from leakage and failure of septic and sewage systems, pet waste, livestock waste, human waste from recreationists, and indiscriminate flushing of RV waste tanks.

A standard septic system uses a septic tank and a leach field. If properly designed, installed well above the water table and in adequately draining soil, constructed, and operated, then a regular septic system is capable of nearly complete removal of fecal coliform bacteria, suspended solids, and biodegradable organic compounds (EDAW, 2005). The most critical factor in determining effectiveness of septic systems for treating the contaminants above is the time that leachate takes to travel between the leach lines and the water table. Deep soils that drain slowly allow for maximum biological processing of the wastewater. Unfortunately, in most soils, septic systems are relatively ineffective for removing nitrogen, pharmaceuticals, and other synthetic organic compounds (EDAW, 2005).

The State Water Resources Control Board is currently (2006) drafting new regulations to address septic systems, also known as on-site wastewater treatment systems (OWTS). California currently lacks statewide regulations or standards on septic systems, and practices vary greatly between regional water quality control boards and local jurisdictions. Depending on what criteria are ultimately adopted, the new regulations could result in greatly increased costs for on-site wastewater disposal or building moratoriums in some areas.

Description of major water-related objectives and conflicts

The objectives of the Inyo-Mono RWMG are thoroughly discussed in Chapter 6.

The relatively mild conflicts over water in the Inyo-Mono IRWM region as of 2010 are best seen in the context of historic water conflicts of the eastern Sierra Nevada.

Water-related conflicts in the Inyo-Mono IWRM region began soon after the arrival of EuroAmerican settlers in the 1850s. The most severe winter on record brought widespread flooding to the area in 1862. The scarcity of food and shelter amid the high water in the southern Owens Valley led to violent conflicts between native Paiutes and the new settlers (Chalfant, 1933; DeDecker, 1966).

As irrigation of fields and orchards throughout the Owens Valley grew rapidly in the late 1800s, discharge in the Owens River dropped dramatically and Owens Lake began to shrink. By 1890, about 250 miles of canals and ditches had been constructed with a combined capacity of about 1,200 cfs (exceeding flow of Owens River much of the year). With completion of the Los

Angeles Aqueduct in 1913, water demand for export began to compete with water demand for local irrigation. From 1913 through 1922, the City of Los Angeles and Owens Valley irrigators apparently got along with an adequate distribution of water, largely because the intake for the aqueduct near Aberdeen was downstream of the principal agricultural areas of the valley (Vorster, 1992). An agreement was almost reached to guarantee water supplies to existing irrigated lands in 1913, but a legal challenge from a private citizen in Los Angeles disrupted the negotiations (Vorster, 1992). A series of dry years from 1921 through 1925 led to the City's effort of purchase land and water rights from 1923 through 1927. There are a wide range of accounts of the circumstances and practices of acquisition during that period (e.g, Chalfant, 1933; Hoffmann, 1981; Reisner, 1986; Smith and James, 1995). Despite much controversy surrounding the real-estate deals, actual prices paid for land and water rights in almost all cases were at least fair-market value and occasionally quite favorable to the sellers (Vorster, 1992; Libecap, 2007). Nevertheless, strong opinions generated during that period have affected most of the subsequent actions, projects, and negotiations by the City of Los Angeles in the eastern Sierra Nevada region.

As growth accelerated in Los Angeles in the 1920s and 1930s, the Department of Water and Power sought to increase its water supplies from the eastern Sierra Nevada. The City filed for appropriative water rights on streams in the Mono Basin, acquired streamside parcels in the Mono Basin, constructed diversion structures, built a dam forming Grant Lake reservoir, and tunneled through the Mono Craters to get water from the Mono Basin to the upper Owens River. Although many residents of the Mono Basin objected to the water export, water began to flow through the Mono Craters Tunnel in 1941 (Hart, 1996). Although initially considered in the 1920s, a second aqueduct was not designed until 1963 and completed in 1970. The additional capacity to remove water from the eastern Sierra Nevada region allowed a doubling of the volume of water exported from the Mono Basin, provided rationale to reduce irrigation of City-owned lands, and created an opportunity to export additional quantities of groundwater. All three activities had environmental consequences and led to strong objections from eastern Sierra residents.

Inyo County filed a lawsuit in 1972 intended to force a reduction in groundwater extraction and export. The legal action used the new California Environmental Quality Act, and courts limited groundwater pumping by LADWP until an Environmental Impact Report was completed. While litigation proceeded in the courts, the county and city attempted to negotiate an agreement to meet the water needs of both regions (e.g, Smith and James, 1995). Focused primarily on groundwater management, the Inyo / LA Long Term Water Agreement provides the basis for resolving some of the conflicts over water allocation in the Owens Valley. The agreement also provided for the rewatering of the Owens River channel downstream of the primary intake for the Los Angeles aqueduct. A series of legal judgments led to the completion of the Lower Owens River Project. Water was released into the channel in December 2006, and flows are used to enhance the river's riparian corridor, improve wildlife habitat in the Blackrock and Delta Habitat Areas, and to maintain off-channel lakes and ponds for recreation.

Although irrigation diversions had markedly reduced Owens River inflows to Owens Lake in the late 1800s and the lake's water level had dropped by about 33 feet between 1878 and 1905 (Lee, 1915), water export to Los Angeles beginning in 1913 continued the loss of inflow to Owens Lake. By 1924, the lake was essentially gone, exposing over 60 square miles of lake bed and creating the largest source of windblown dust (PM-10) in the United States. In 1987, the U.S. E.P.A. found that the southern Owens Valley was in violation, and subsequently in 1993, in "serious non-attainment" of PM-10 particulate matter air-quality standards. Because of the connection between removing the inflows to the lake and the consequent empty lakebed, the Great Basin Unified Air Pollution Control District, the California Air Resources Board and the U.S. Environmental Protection determined the City of Los Angeles is responsible for controlling the air pollution emissions from the dry lakebed. In 1998, the Great Basin Unified Air Pollution Control District and the City of Los Angeles entered into a memorandum of understanding to control dust emissions from the lakebed. Over the past decade, the City has expended hundreds of millions of dollars and has recently applied about 90,000 acre-feet of water per year to control dust (Great Basin Unified Air Pollution Control District, 2008). An Owens Lakebed Master Plan is currently (December 2010) being developed to resolve issues such as continued dust control and water use, wildlife habitat, and possible solar power generation at Owens Lake. The air pollution levels dropped about 90 percent between 2000 and 2009 as dust controls were implemented.

Following completion of the second aqueduct, export of water from the Mono Basin became a widely recognized controversy. When diversions out of the basin approximately doubled in 1970, the level of Mono Lake dropped and the salinity increased. In 1978, the Mono Lake Committee was formed with the initial goal of restoring Mono Lake back to the water level it had in 1976, which would limit some of the ecological consequences of diverting its tributary streams. The water diversion conflict in Mono County generated a large amount of press coverage and public attention. Inevitably, the issue entered the legal system. An initial suit, brought by the National Audubon Society, advanced relatively quickly on appeal to the California Supreme Court. The court's decision in February 1983 found that the allocation of the waters of the Mono Basin needed to be reconsidered, including public trust values. In autumn of 1984, another lawsuit based on a section of the California Fish and Game Code, led to a decision to maintain flows below Grant Lake dam adequate to maintain the fishery that became reestablished during the big winters of 1982 and 1983. Further legal actions led an injunction in 1991 to maintain the then-current lake level while the State Water Resources Control Board studied the diversions of water from the Mono Basin streams. In September 1994, the Board issued its decision, amending the licenses so as to partially restore Mono Lake and its tributary streams (Hart, 1996).

Comparatively minor operational conflicts continue over the progress and form of Mono Basin stream restoration efforts. In the past decade, a local controversy has ensued over the distribution of water between Mill Creek and Wilson Creek in the northwestern part of the basin. The matter is expected to be addressed through the hydropower relicensing process of the Federal Energy Regulatory Commission.

At the north end of the planning region, the long-term trade-off between irrigation and maintaining Walker Lake is the fundamental conflict over water. The dramatic decline in the level and volume of Walker Lake and the consequent increase in salinity and changes in the lake's fishery have attracted national attention. Between 1882 and 1994, as irrigation consumed water from the Walker River, the surface elevation of Walker Lake fell by about 140 feet and the volume decreased by about 75 percent (e.g., http://nevada.usgs.gov/walker/). Concentration of salts has increased five-fold over this period. The native Lahontan cutthroat trout and other species in the lake have barely survived this increase in salinity. The volume of water subject to appropriation through existing water rights is 40 percent greater than the average annual inflow to the lake. Most of the water that actually reaches the lake enters during major floods that exceed the upstream capacity of storage reservoirs. Although there is potential to improve water supplies by conjunctive use of groundwater and surface water and greater water conservation through ditch lining, upgrading distribution systems, and irrigation scheduling, the political will to acquire or alter water rights is lacking. Although the volume of water evaporated through irrigation on the California side of the stateline is small compared to that downstream in Nevada, opportunities for purchase or lease of water rights are being explored within the California portion of the basin.

The primary water issue within the upper Owens River watershed is supplying water for the town of Mammoth Lakes without adversely affecting aquatic habitat in Mammoth Creek or water quantity and/or temperature at the Hot Creek hatchery springs. This water supply concern has been a persistent problem since the 1970s and becomes more acute with the town's growth. The Mammoth Community Water District (2004) prepared a water assessment and an amendment (Mammoth Community Water District, 2005) in response to the general plan update process of the Town of Mammoth Lakes. The assessment determined that there was insufficient water from existing supplies to meet demands in dry years. A draft EIR regarding the Mammoth Community Water District's water right permit to Mammoth Creek was released in September 2010. The EIR process should resolve most of the issues regarding diversions from the stream.

The development of geothermal energy near the junction of U.S. Highway 395 and State Route 203 led to the creation of the Long Valley Hydrologic Advisory Committee, a technical group that monitors wells, springs, and streams down gradient of the geothermal plant for signs of any changes that might be related to the geothermal development and/or overuse of water from Mammoth Creek in the town of Mammoth Lakes.

Because of the lack of comprehensive data on the safe yield of the region's many isolated aquifers, new residential developments frequently face opposition based on the inadequacy of water supply data. Although the CEQA process addresses this issue and individual water availability analyses are performed, these studies are frequently viewed with skepticism by those within close proximity to the development, who fear their own water supplies will be impacted. Without major advances in localized groundwater data, this problem will likely continue.

In the Mono Lake and Owens Rivers basins, about 460 miles out of 530 miles of streams are affected by water diversions (Inyo National Forest, 1987). During the 1980s, under the favorable conditions created by the Public Utilities Regulatory Policy Act, at least a dozen small-scale hydroelectric projects were proposed on streams of the eastern Sierra Nevada. None of those projects were built, although plans occasionally resurface (*e.g*, on Pine Creek).

Historic conflicts over water resources in the Inyo-Mono region have centered on water exports, impacts on closed-basin lakes, and groundwater pumping. Current conflicts seem both milder in intensity as well as focused on other issues, such as water quality, community water supply, water conservation, and allocations supporting environmental benefits. Today, the level of controversy within the region seems greatly reduced compared to our history. Although disagreements certainly persist over water in such an arid region, there appears to be a greater willingness by most parties to attempt to resolve differences though negotiation and collaborative processes and avoid litigation. The Owens Lakebed Master Plan effort and our Integrated Regional Water Management group are examples of this current direction.

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Chapter 4: Climate change

Introduction

The California Department of Water Resources, along with other State and federal agencies, has begun to recognize anthropogenic climate change as a significant threat to water resources management and reliability. The Inyo-Mono IRWM Phase I Plan begins to address the impacts of and responses to climate change in the Inyo-Mono region. The Phase II Plan will address climate change in more detail, including quantitative assessments of energy use and greenhouse gas emissions resulting from water management activities in the region as well as proposed water projects.

Description of expected climate change impacts

California is fortunate to have many climate modelers and climate researchers specifically focusing on expected climate change impacts for the State and specific regions within the State. A discussion of projected changes in temperature and precipitation can be found in the *Descriptive Geography* section of Chapter 3. Because the Sierra Nevada snowpack is a major water reservoir for downstream urban, agricultural, and industrial users, potential changes in snowpack, water content, and streamflow are of particular concern for water managers. While the magnitude of precipitation is not expected to change substantially, changes in seasonality of precipitation and increases in temperature will impact snowpack, snow water content, and streamflow timing and amounts. Such changes in hydrology are important to measure and understand. While modelers have simulated changes in many of the west-flowing Sierran rivers, little work has been done on the waterways in the Inyo-Mono IRWM region. It is necessary to have more specific and quantitative projections of changes in this region to understand potential impacts to water resources. This is especially important for the Inyo-Mono region as water exports are a major use of Eastern Sierra water, and the City of Los Angeles depends upon these exports.

Specific impacts of climate change to water resources management vary throughout the region and may be as diverse as the water systems themselves. In addition to direct impacts on water resources, indirect impacts to water may occur through impacts to terrestrial systems. Examples of this include impacts to vegetation and soil properties. Also of concern is how climate change will impact land use. In the Inyo-Mono region, major land uses include grazing, recreation, agriculture, and conservation. Changes in land use from one type to another may affect water quality and quantity.

A significant issue in understanding climate change-related impacts to water systems is the rural and remote nature of the Inyo-Mono planning region. Much of the information regarding climate change and water resources provided by the State does not filter down to water managers in the region. In general, more region-specific information, along with more effective dissemination techniques, is needed. Phase II of the Inyo-Mono IRWM Plan will include a more detailed description of expected climate change impacts.

Climate change mitigation/GHG reduction

In California, the transportation, delivery, and use of freshwater accounts for 19% of the total electricity used (California Energy Commission, 2005). Recently, more attention has been paid to reducing the amount of energy used in water resources management. In the Inyo-Mono region, little to no accounting of water-related energy use and greenhouse gas emissions has taken place. While techniques to perform such accounting have improved, most water agencies and rural water districts in the region do not have the resources to perform these tasks. Funds were requested in the September, 2010, Planning Grant application to begin quantifying water-related energy use and emissions during the development of the Phase II Plan. At that point, the I-M RWMG will have more information with which to better assess how to reduce energy consumption and GHG emissions both on an aggregate scale and on a project-by-project basis.

The I-M RWMG has recognized, however, that it is necessary to begin thinking about how water projects in the region will be impacted by and will impact climate. In the region-specific ranking criteria for Round 1 Implementation projects, two climate change-related questions were posed to each project proponent: “Will this project result in reduced greenhouse gas emissions? If yes, explain how.” and “Will this project contribute to developing or implementing adaptation strategies to respond to climate variability impacts on water resources? If yes, explain how.” While it was not expected that project proponents would necessarily be able to fully consider these issues during Round 1, it is expected that project proponents should develop an awareness of how water resources management relates to climate change and to begin to seriously consider this in future rounds of project submittals. The I-M RWMG will draw upon many resources, include in-house expertise, DWR staff, Sierra Nevada Alliance staff, and others, to aid the group in more fully understanding and accounting for climate change in the future.

Climate change adaptation strategies

Climate change adaptation strategies as they relate to water resources management are still fairly new and undeveloped. Researchers and state and federal agencies have put much thought into the subject and have produced a plethora of reports, papers, and guidance. Specific examples of actual adaptation strategies being put into practice, however, are lacking. DWR published a report in 2008 titled “Managing and Uncertain Future: Climate Change Adaptation Strategies for California’s Water”. In this report, DWR proposes 10 adaptation strategies for water resources management:

- Provide sustainable funding for statewide and integrated regional water management
- Fully develop the potential of integrated regional water management
- Aggressively increase water use efficiency
- Practice and promote integrated flood management
- Enhance and sustain ecosystems
- Expand water storage and conjunctive management of surface and groundwater resources
- Fix Delta water supply, quality and ecosystem conditions
- Preserve, upgrade, and increase monitoring, data analysis, and management
- Plan for and adapt to sea level rise
- Identify and fund focused climate change impacts and adaptation research and analysis

While not all of these strategies are relevant for the Inyo-Mono region, many of them are, and using this list as a guide will allow water managers to begin thinking about how to manage their water supplies in response to climate change impacts.

Similar to climate change mitigation and greenhouse gas reduction strategies, climate change adaptation strategies are not well-understood in this remote region. Information produced by DWR and other state and federal agencies regarding climate change rarely filters down to rural water agencies and community water districts. While some of the larger urban water districts are able to commit staff time to considering climate change mitigation and adaptation strategies, smaller water districts simply do not have the resources to do so. A goal of the RWMG is to provide information to its members and the larger community about potential climate change impacts and possible response strategies in the region. This will include topic-specific discussions at RWMG meetings as well as public information sessions on climate change. One resource available for water managers and practitioners in the Inyo-Mono region is a dissertation chapter written by one of the IRWMP staff members (Alpert, 2009). This paper explores potential climate change impacts to the Mammoth Lakes water system and provides an analysis of possible adaptation strategies to respond to these impacts.

Climate change adaptation strategies for the Inyo-Mono region will be more fully explored in Phase II of the Inyo-Mono IRWM Plan.

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Chapter 5: Outreach and Engagement

Community and stakeholder involvement

Since its inception, the Inyo-Mono IRWMP has been committed to encouraging greater stakeholder involvement and outreach to potential participants. The RWMG recognized early in the process that because of the large size of the planning region and the breadth of water issues within the region, it would be important to create an inclusive process. As a result, the RWMG has maintained its commitment to public meetings, outreach to new stakeholders, and incorporation of Tribes and disadvantaged communities.

Process used to identify stakeholders

The original stakeholders of the Inyo-Mono Regional Water Management Group consisted of the Sierra Nevada Alliance, California Trout, and California Department of Water Resources, with facilitation provided by the Center for Collaborative Policy. One of the primary tasks of this initial group was to identify water-related stakeholders in the planning region and to encourage attendance and participation at RWMG meetings. Within the first few months of the IRWMP process, meeting attendance grew to 35-40 people. Throughout the first two years, effort was continually made to identify new stakeholders and invite them to participate in the process. This was mostly done through word-of-mouth through the existing RWMG participants.

Stakeholder composition

The I-M RWMG recognized early in the process that comprehensive stakeholder representation was essential to the success of the Group. From the beginning, effort was made on the part of Project Staff and existing RWMG participants to involve stakeholders from many different types of organizations that focus on water: government agencies, non-profit organizations, businesses, water suppliers, academic institutions, and Native American Tribes. Currently, all of these sectors are represented in the RWMG by at least one organization, and in many cases, several organizations. The specific composition of the RWMG can be seen in Appendix A.

In addition to the stakeholders who regularly attend meetings or otherwise participate in the IRWMP process, there is a list of stakeholders who receive communications about the I-M

IRWMP but who do not actively participate (Table 1-1). As time permits, staff and RWMG participants attempt to make contact with these entities and encourage increased participation.

Given the very large area of the Inyo-Mono planning region, it is not possible to reach out to and include every stakeholder with water interests. However, considerable effort has been put into ensuring that all communities and areas of the region are represented by at least one stakeholder group. A further challenge is maintaining levels of stakeholder involvement through staffing changes, budget cuts, and shifting priorities. If Project Staff observes that a previously engaged stakeholder has not been participating at the same level, they contact the organization and work to facilitate that entity's continued involvement. Having broad and consistent representation in the RWMG is key as the representatives bring many different opinions and points of view to discussions. The Inyo-Mono RWMG is truly a grassroots, member-driven organization.

Stakeholder involvement

I-M RWMG members are involved in a variety of ways. At the most basic level, RWMG members attend and participate in Group meetings. A subset (six) of RWMG members sits on the Administrative Committee, which provides guidance to staff and helps to resolve conflict within the RWMG. Staff relies on the Administrative Committee, as well as other RWMG participants, to provide feedback and advice on day-to-day decisions and operations. RWMG participants also have opportunities to participate in work groups that perform specific tasks or functions, such as developing budgets for grant proposals, researching issues as they arise, creating project review criteria, or assisting with writing assignments. Because of the large and remote nature of the Inyo-Mono region, many stakeholders only participate in RWMG meetings by phone, or if they cannot participate at all, they can stay informed about I-M IRWMP activities through the website or through contact with staff. Stakeholder involvement is welcome at any level.

Any member of the public is allowed to attend and contribute to RWMG, Administrative Committee, and work group meetings. In the summer of 2010, the I-M RWMG decided by consensus that it would conduct all its activities under the provisions of the Ralph M. Brown Act. Stakeholders and other members of the public can find meeting information on the I-M IRWMP website, in local newspapers, and at several posted locations throughout the region. Furthermore, each RWMG meeting agenda is presented to both the Inyo County and Mono County Boards of Supervisors and thus becomes part of the public record. Call-in locations are available and open to the public.

Stakeholders that wish to put forward projects for funding under the IRWM program are strongly encouraged to attend RWMG meetings and are required to sign the Memorandum of Understanding.

Disadvantaged communities

Through Prop. 84, DWR has placed emphasis on reaching out to and supporting disadvantaged communities in the IRWM Program. The initial Planning Committee recognized that the I-M IRWM planning region contains many DACs, as defined by 2000 census median income data. In addition, several unincorporated communities within the region are too small to be counted in the census data and thus are not considered DACs, even though they might fall into that category. The I-M RWMG will use 2010 census data, as well as median income data collected at the county level, to update the list of DACs found within the I-M planning region. The process of determining which communities in the region are DACs, as well as a list and a map of the identified DACs, is discussed in Chapter 1 (Development Process for the Inyo-Mono IRWMP).

Public outreach and education

The RWMG continues to refine its outreach and engagement methods, especially targeting disadvantaged communities and populations of low representation. Staff relies heavily on the knowledge and contacts of current RWMG participants and other stakeholders in determining which potential new stakeholders to contact. The Inyo-Mono IRWM Project Staff has developed written materials to aid in providing information to new stakeholders. New stakeholders have expressed that they find it difficult to learn about the history, process, and current activities of the I-M IRWMP, and written materials help to distill this information. These documents are available on the website or from IRWMP staff and are updated as needed.

Project staff and members of the I-M RWMG conduct outreach on a continual basis to encourage further participation from all groups within the planning boundaries that have interests in water resources management. Most often, outreach occurs through attending meetings of various entities throughout the planning region. Either IRWMP staff or RWMG participants attend such meetings to provide an overview of the IRWMP process and to answer questions. These meetings may be ongoing public meetings, such as Mono County Regional Planning Advisory Committee (RPAC) meetings, individual meetings with stakeholders, or special IRWMP outreach meetings (described below). Outreach has also been conducted and is on-going with other Sierra IRWMP groups such as CABY, Upper Feather, Tahoe-Sierra, Southern Sierra, Mojave, Antelope Valley, Mariposa, Kern County and Madera County. This outreach builds rapport among other regional efforts and contributes to collaboration among other mountain-region and headwater RWMGs. In addition, the knowledge gained from discussions with other IRWM groups has provided valuable information for structuring the Inyo-Mono RWMG.

In 2010, with the help of funding from DWR, the Inyo-Mono RWMG was able to secure assistance from the Center for Collaborative Policy (CCP) to conduct an intensive and targeted outreach campaign throughout the planning region. Sub-regions were identified that were previously under-represented at RWMG meetings. Evening meetings were scheduled in each of the sub-regions, and local groups and individuals were identified and invited to participate (although each meeting was also open to the public). At least one or two RWMG participants were present at each meeting, as well as IRWMP and CCP staff. The meetings attracted as few as two and as many as 12 new participants. In total, seven meetings were convened and 22 new participants were added to the RWMG contact list. These meetings were instrumental in identifying local water concerns and water management-related objectives.

Inyo-Mono IRWMP staff and one RWMG member visited the southeastern portion of the planning region in March, 2010, to conduct meetings with several potential stakeholders, including local residents of the communities of Shoshone and Tecopa, Death Valley National Park staff, and Timbisha-Shoshone Tribal staff. Staff returned to the area in October, 2010, to meet again with stakeholders and answer questions from the community. At this time, several specific water needs were identified.

Technology and information access

Communication between staff and the RWMG, and among RWMG participants, primarily occurs via email. IRWMP staff uses email to send out meeting notices and agendas, documents, announcements, and other relevant material. The project website (www.inyomonowater.org) is used as another primary tool for outreach and communication throughout the I-M IRWM planning region. On this website, visitors can find topics such as introductory information about the I-M IRWMP, member organizations, meeting summaries, and links to other IRWMP groups. Documents that are sent to the RWMG through email are usually also posted to the website. It has become evident, however, that email and the website are not always the best communication or outreach tools in this expansive, largely rural, and economically disadvantaged region. Many people in the I-M IRWMP planning region do not have adequate internet access; thus, Project Staff is working to identify the best means to keep everyone informed in the region, such as hardcopy newsletters that are sent via U.S. mail.

The Inyo-Mono IRWMP effort has been visible within local media outlets. The three most widely-read local newspapers have each run several articles about various aspects of the Inyo-Mono IRWMP, including interviews with IRWMP staff and RWMG participants. There are several documented cases of these articles contributing to the involvement of new RWMG participants. More recently, a staff member from one of the local newspapers has been regularly attending RWMG meetings and has been posting meeting announcements and agendas on the newspaper’s website.

Governance and decision-making

Since the inception of the Inyo-Mono IRWMP in 2008, the group has been governed by a Memorandum of Understanding. The first MOU, which governed the pre-planning phase of the I-M IRWMP process, was adopted in November 2008 and was subsequently signed by 28 organizations (Appendix B). It was later agreed among RWMG members that the MOU should be updated and revised to reflect the group's progression into the planning and implementation phases. A work group made up of a subset of RWMG participants developed a new MOU that took effect November 15, 2010, with 22 signatories (Appendix C). Additional organizations may sign the MOU at any time, and a continually updated list of signatories is available on the website. The planning/implementation MOU will undergo a revision process in early 2011 as there were some outstanding comments that did not get addressed before the November 15 date.

Decision-making in the RWMG has always occurred through consensus. The I-M RWMG's operational definition of consensus is that all entities either approve or can live with the item being decided upon. If one or more entities disapprove, then no decision is made. Only MOU signatories can participate in this decision-making process. Every group has one "vote" and thus equal power, regardless of the size or influence of any given entity. Certain decisions that are not approved by the group are placed into a "parking lot" for consideration at a later date. More information about the governance and decision-making processes of the I-M RWMG can be found in Chapter 2 (Governance).

Integration of stakeholders and institutions

One of the most tangible, yet unquantifiable, benefits of the I-M IRWM process to date has been the practice of gathering water-related stakeholders at meetings on an almost-monthly basis to discuss the group, its activities, and water issues. Many of the organizations sitting at the table have historically been at odds over water issues. While it is not expected that the RWMG will solve water-related conflicts in the region, many participants have acknowledged the advantages of increased communication and cooperation among adversaries and allies alike. In addition, during the RWMG's visioning exercise in early 2010, several RWMG participants expressed the desire that the IRWMP process should help individual stakeholders overcome conflict and should allow the group to speak with one voice and from common objectives.

The I-M IRWM process has helped to educate stakeholders about each other's activities and priorities. Smaller water districts have sought advice from larger water districts on technical issues. Disadvantaged communities benefit by learning from groups with more experience in water management, and in turn, RWMG stakeholders have begun to understand the difficulties of maintaining high-quality water resources and ecosystem protection in small, rural communities.

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Chapter 6: Goals, Objectives, and Resource Management Strategies

Development of Inyo-Mono IRWM Plan Goals, Objectives, and Resource Management Strategies

In the IRWM planning process, development of goals and objectives is a key step, as they provide a basis for decision-making, guide work efforts, and can be used to evaluate project benefits. Understanding this, the Inyo-Mono RWMG started the discussion by defining a mission and vision to guide the overall effort. Utilizing a consensus based approach, the RWMG adopted the following mission statement to guide the overall planning effort:

> *To research, identify, prioritize, and act on regional water issues, and related social and economic issues, so as to protect and enhance our environment and economy. Working together, we create and implement a regional water management plan that complies with applicable policies and regulations and promotes innovative solutions for our region's needs.*

To help the diverse communities living within the planning region understand their role in implementing and undertaking this mission, the RWMG adopted the following vision statement:

> *Our vision is a landscape that is ecologically, socially, and economically resilient. As diverse stakeholders, we identify and work toward our common goals. We achieve a broad-based perspective that benefits our regional ecosystems and human communities by combining our interests, knowledge, expertise and approaches. We strive to have every voice heard within our region and our collective voice heard in the state and nation.*

True to this vision, the RWMG has worked hard to solicit input from the varied residents and organizations within the extremely large planning region. To begin the process of soliciting stakeholder participation and input into the development of goals and objectives, staff collected and reviewed all relevant water supply plans, general plans, resource management plans, and existing watershed planning efforts and developed an initial list of goals and objectives in the summer of 2008. A draft was released at the August 25, 2008, RWMG meeting, and comments on that draft were received from various RWMG participants throughout the month of September. A work group was formed in early 2009 to further refine the work and present back to the RWMG.

The written product of this effort presented water resource objectives and management strategies organized under three strategic goal areas: Watershed Ecosystem Health, Water Resources, and Water and Community. Each goal had a number of specific objectives and management strategies identified. With this initial work in hand, the RWMG undertook an extensive outreach campaign in 2009 and 2010 across the planning region to meet with interested parties and identify and discuss their water related issues and concerns. Based on these meetings with interested landowners and representatives from various Tribes, non-profits, and rural communities, the initial strategic goal areas were confirmed to be appropriate and the objectives and management strategies were clarified and refined. During this time, the RWMG also decided to simplify the presentation of the goals and objectives in order to better align with the identified concerns and with the California Water Plan, Proposition 84 requirements, and the Lahontan Basin Plan. After much discussion and review of feedback received from extensive outreach within the region, the RWMG agreed to drop the goal area statements and simplify the objectives and corresponding resource management strategies. A draft of the revised objectives and strategies was widely distributed to interested parties, including the Board of Supervisors of both Inyo and Mono Counties as well as to all parties that had contributed during the outreach campaign. Incorporating the input received from this round of review, in late 2010, the RWMG adopted the following six regional objectives:

1. Protect, conserve, optimize, and/or augment water supply;
2. Protect, restore, and/or enhance water quality;
3. Provide stewardship of our natural resources;
4. Maintain and/or enhance water, wastewater, and power generation infrastructure efficiency and reliability;
5. Address climate variability and/or reduce greenhouse gas emissions; and
6. Increase participation of small and disadvantaged communities in the IRWM process.

Although six independent objectives have been established to achieve the vision, relationships and synergies exist between the various objectives. For example, by increasing participation of disadvantaged communities in identifying and implementing projects aimed at improving water quality and achieving water supply objectives, the residents will be taking responsibility themselves for helping to meet natural resource stewardship objectives. Thus, integration of planning efforts with agreed upon objectives and strategies is realized within the I-M RWMG.

Overview of the IRWM Plan Objectives and Resource Management Strategies and the Issues they Address

The planning objectives are targeted outcomes that benefit the region. When implementing regional projects, project partners will strive to meet as many objectives as possible while also recognizing that some objectives may not be fully achieved. The objective prioritization process and measurement strategies are discussed in the next section.

The following describe the objectives, their rationale, and corresponding resource management strategies to achieve the objectives that have been developed for the IRWMP.

Objective 1: Protect, conserve, optimize, and/or augment water supply

Water is a highly valued resource in the Inyo-Mono IRWM region. Rivers, streams, lakes, and aquifers supply water for domestic, agricultural, and recreational uses, support abundant wildlife and fisheries, and are an important aesthetic component of the local landscape. Water resources in the region have been heavily impacted over the years by the export of large volumes of water for use outside the planning region, a practice that has been detrimental to local water users and the natural environment within the region. The potential for future export, particularly of groundwater, is a continuing concern.

Water for future development is a concern. While some communities have community water systems, other areas are served by a variety of mutual water companies, small private systems, and wells. Existing water rights are in some cases inadequate for future expansion and additional surface water is becoming impossible to obtain due to concerns about in-stream and water-dependent resources. Inadequate and insufficient data about many groundwater resources hinder projections on meeting future demand from those sources. Potential off-site impacts on natural resources as a result of groundwater extraction are also a concern. In addition, wells for existing development are running dry in some areas; pumping new and deeper wells is expensive. At this time, many areas do not know how much groundwater is available, nor can they assume a constant supply of groundwater in the future.

The availability of water for future development is also affected by new requirements concerning water quality. Existing community water systems that do not meet the standards set by the Lahontan Regional Water Quality Control Board (RWQCB) will have to update their systems. The cost of doing so may inhibit the ability of those systems to provide additional water for future development. In areas that do not currently have community systems, the Lahontan RWQCB will require a community system when a certain level of development is reached. The cost of installing and maintaining a system may preclude additional development in areas which are currently served by wells or small private systems.

To address these water supply concerns, the following resource management strategies have been adopted by the RWMG in order to identify projects aimed at developing a more reliable and diverse water supply portfolio:

1.1. Improve water supply reliability;
1.2. Improve system flexibility and efficiency;
1.3. Support compliance with current and future state and federal water supply standards;
1.4. Address local water supply issues through various techniques, including, but not limited to: groundwater recharge projects, conjunctive use of water supplies, water recycling, water conservation, water transfers, and precipitation enhancement;
1.5. Advance understanding of regional groundwater issues (including monitoring) and provide for solutions;
1.6. Optimize existing storage capacity;
1.7. Conserve and adapt water uses to future conditions;
1.8. Capture and manage runoff;
1.9. Incorporate and implement low-impact development design features, techniques, and practices to reduce water demand; and
1.10. Support appropriate recreational activities.

Objective 2: Protect, restore, and/or enhance water quality

A primary goal of the IRWM Plan is to provide high quality drinking water that meets current and future federal and state drinking water standards throughout the region. Clean, reliable, and safe drinking water is essential to public health and the economic well being of the region. The region's IRWM water quality objectives are consistent with the intent of Safe Drinking Water Act goals to protect drinking water "from source to tap" and broader Clean Water Act goals for clean, fishable, and swimmable waters.

The region's water quality related issues vary and certain areas are affected by outdated and aging water related infrastructure, land management practices, sewage disposal, construction practices, solid waste disposal, road maintenance techniques, naturally occurring minerals and ores, etc. There is a concern in some areas about the potential impacts of increased stormwater runoff resulting from increased development. Potential impacts in some areas include increased streamflows, siltation, erosion, loss of aquatic habitat, and impacts to roads and agricultural areas. In other areas, particularly in the Indian Wells Valley, salt accumulation creates issues for both human water consumption and agricultural concerns.

At present, the water quality of the snowmelt runoff is generally excellent, but degraded in some reaches and threatened throughout the entire unit due to non-point source loading from increased recreational use, grazing, development, and on-site septic systems. The Owens hydrologic unit (Mammoth Creek, Crowley Lake, and Pleasant Valley Reservoir) is an impaired waterbody identified in Table 3 of the 2010 CWA 319(h) NPS Grant Program Guidelines. Although Total Mean Daily Loads (TMDLs) have not been established for the Owens hydrologic unit, constituents of concern include: mercury, dissolved oxygen, ammonia, and organic enrichment.

In other areas, aquifers of poorer-quality water underlie the high-quality aquifer currently being pumped. As groundwater levels continue to decline, underlying poorer-quality water may begin to mix with high-quality water, resulting in deterioration of the quality of the water supply. In many locations, portions of the aquifer have levels of arsenic and uranium higher than the current primary drinking water maximum contaminant limit (MCL), requiring treatment prior to domestic use. Of particular concern are areas in north Mono County where drinking fountains at public schools are shut off due to exceedingly high levels of arsenic and uranium, and in southeastern Inyo County, where very limited and poor-quality potable water is available. In other areas, nitrogen and phosphate levels are elevated.

In response to these identified issues, the following resource management strategies were established toward meeting the goal of improving water quality:

- 2.1. Improve the quality of urban runoff, storm water, and wastewater;
- 2.2. Reduce erosion and sedimentation;
- 2.3. Protect public and aquatic ecosystem health;
- 2.4. Match water quality to water use; and
- 2.5. Support appropriate recreational activities.

Objective 3: Provide stewardship of our natural resources

Many cross-cutting issues overlap with and link to the objectives for water quality and water supply. These cross-cutting issues serve as a reminder that the availability of high quality water is not only critical to the success of the human population, but also to the ultimate survival of plant and wildlife populations dependent upon healthy ecosystems.

The protection and enhancement of natural habitats is a critical element in preserving and restoring the long-term existence of regional flora and fauna. Riparian woodlands, wetlands, migration corridors, and wintering and summering grounds are recognized as critical, highly localized wildlife habitat. Increased recreational use in the region and increased development, particularly in areas outside of existing community areas, creates potential impacts to the long-term sustainability of fish and wildlife populations and plant communities through degradation of resources and increased conflicts between wildlife and humans. Invasive species can alter natural ecosystems by replacing native plant and animal communities, resulting in native species being negatively affected. As an example, introduced trout have displaced native Lahontan cutthroat trout and amphibians in many parts of the northern watersheds of the region.

Across the region, interested parties stressed the value and importance of the natural environment for a variety of reasons, including, but not limited to, the health of native flora and fauna, providing a wide variety of recreation interests, and supporting a number of agricultural and grazing operations. The region is home to a variety of unique species of fish, wildlife and aquatic invertebrates, including a number of threatened and endangered plants and animals – for example, endangered Owens tui chub. Hot Creek and the Upper Owens River are two of the most productive and popular trout fisheries in California and, as a result, provide for world-class fishing which supports the local economy.

The following resource management strategies were established toward meeting the objective of increasing the understanding of the natural resources in order to provide increased and appropriate stewardship within the planning region:

3.1. Protect, restore, and/or enhance natural processes, habitats, and/or threatened and endangered species;
3.2. Protect, restore, and/or enhance ecosystems such as upland forests, meadows, wetlands, and other sensitive habitats dependent on surface/shallow water supply;
3.3. Enhance recreational and/or educational opportunities;
3.4. Identify, develop, and implement efforts to better control invasive species; and
3.5. Assess ecosystem health of watersheds in the region.

Objective 4: Maintain and enhance water, wastewater, and power generation infrastructure efficiency and reliability

Throughout the region, and in disadvantaged communities in particular, outdated water storage and conveyance equipment, lack of back-up generators, and/or antiquated piping present a serious challenge to providing safe and reliable water supplies for both human consumption and fire protection. Compounding this situation is the fact that many of the antiquated water systems are in areas that experience extremely cold winters with significant snowfall and, thus, the period of time during the year within which any construction and/or maintenance can occur is extremely limited. Moreover, many of these same areas do not have the institutional capacity to effectively manage their water related infrastructure and regulatory compliance matters.

Since many of the areas within the region rely on very old and inefficient equipment and motors to drive their groundwater pumping and water conveyance, a significant amount of energy is currently being wasted. Additionally, a number of energy intensive power generating facilities as well as significant water conveyance structures exist within the region that could be retrofitted to improve their efficiency and reduce greenhouse gas emissions while also improving reliability. As such, the following resource management strategies were established toward meeting the objective of maintaining and enhancing water related treatment and power generation efficiency and reliability:

4.1. Systematically and strategically rehabilitate and replace aging water and wastewater delivery and/or wastewater treatment facilities in rural communities, including tribal lands;
4.2. Ensure fire protection capacity;
4.3. Improve energy efficiency of water systems and uses; and
4.4. Promote use of water efficiency in power generating facilities.

Objective 5: Address climate variability and reduce greenhouse gas emissions

As stated in the CA Water Plan 2009, climate change models suggest that the North Lahontan region will generally receive less annual precipitation, with more precipitation falling as rain.

Scenarios indicate a higher reliance on groundwater to maintain current levels of agricultural development and to accommodate population growth. In the Southern Lahontan Region, reliance on groundwater may also increase due to reductions in local surface flows and snowpack quantity. Drier-than-average conditions may result in an increase in the frequency of fires and area consumed as well. Primary and secondary impacts caused by fires include damage to an existing watershed, changes in surface runoff and percolation, and the economic impacts on the area. Additionally, forthcoming climate change legislation may spur increased local development of alternative energy production facilities, which may have their own water demands.

In order to prepare the region for increasing climate variability and to help reduce greenhouse gas emissions, the following resource management strategies have been established:

5.1. Increase understanding of water related greenhouse gas emissions;
5.2. Manage and modify water systems to respond to increasing climate variability; and
5.3. Use cleaner energy sources to move and treat water.

Objective 6: Increase participation of small and disadvantaged communities in IRWM process

The RWMG's Mission emphasizes the need for a consensus approach in water resources management within the Region, and the Vision emphasizes the need for a stakeholder-driven process. Maximizing stakeholder and community involvement and stewardship is essential to the success of the IRWM Plan.

Stakeholder involvement is a vital part of the IRWM Plan process as a means to identify and address public interests and perceptions, address stakeholder questions and issues, ensure that the Plan and any proposed solutions are in keeping with public interests, and provide for public ownership and support of the proposed solutions. Stakeholder involvement may assist in identifying areas where increased public education and outreach is required and help focus the Plan toward the public's key water management issues and potential solutions. Public education and outreach at community events, workshops and school-based educational programs are required to promote the identification and understanding of the Region's resources. Public education also increases:

- awareness of water management opportunities,
- stakeholder input of water management ideas, and opportunities,
- public activism, and
- public and community ownership of both problems and solutions.

As discussed previously, the IRWMP has been developed in an interactive, open and transparent process in which the concerns and interests of different stakeholders have been taken into consideration. Continued and increased stakeholder interaction during subsequent phases of the IRWMP, including implementation of projects, has been established as an integral component of the overall vision with the following specific strategies:

6.1. Engage regional communities in collaborative water and natural resource related efforts; and
6.2. Provide assistance for tribal and DAC consultation, collaboration, and access to funding for water programs and projects.

Prioritization of the IRWM Plan Objectives and Resource Management Strategies

While the Inyo-Mono RWMG has not prioritized its objectives and corresponding resource management strategies at this time, there is explicit support for Round 1 Implementation projects that benefit disadvantaged communities and Tribes. The RWMG recognizes that by pursuing a wide range of projects that support the six independent objectives, synergies between the various objectives will be enhanced and the end result will be in pursuit of the overarching mission. Since this plan represents the region's first IRWM effort, the RWMG supports project that advance of any of the stated objectives. When implementing regional projects, project proponents will strive to meet and integrate as many objectives as possible while also recognizing that some objectives may not be fully achieved. Furthermore, additional objectives may be considered in future revisions of the IRWM Plan. For example, while the RWMG has discussed flood control and management as a priority issue for the region, the Group did not feel it should be a priority objective for this round of funding. It may be considered in future rounds.

Measurement of the IRWM Plan Objectives and Resource Management Strategies

The RWMG understands and appreciates the need for a method to evaluate the effectiveness of the IRWM Plan. While some objectives and resource management strategies lend themselves to more easily measured metrics, others present more of a challenge. As such, the RWMG has developed the following initial list of metrics for each of the identified resource management strategies. During implementation of Round 1 Implementation projects, the RWMG will revisit these metrics and develop refinements based on what is learned from the various projects.

Table 6-1. Inyo-Mono IRWM objectives and resource management strategies and the metrics with which they will be evaluated.

Objective / Resource Management Strategy	Measurement
Objective 1: Protect, conserve, optimize, and/or augment water supply	
1.1 Improve water supply reliability	Reduce the number of water distribution systems that are unable to attain or distribute a reliable potable water supply.

Objective / Resource Management Strategy		Measurement
1.2	Improve system flexibility and/or efficiency	Reduce the amount of water lost and/or increase in the number of uses resulting from specific water sources
1.3	Support compliance with current and future state and/or federal water supply standards	Reduce the number of water supply standards compliance violations
1.4	Address local water supply issues through various techniques, including, but not limited to: groundwater recharge projects, conjunctive use of water supplies, water recycling, water conservation, water transfers, and precipitation enhancement	Number of water supply projects successfully implemented
1.5	Advance understanding of regional groundwater issues (including monitoring) and provide for solutions	Number of studies and/or monitoring efforts being undertaken
1.6	Optimize existing storage capacity	Increase in volume of water stored
1.7	Conserve and/or adapt water uses to future conditions	Reduce amount of water used
1.8	Capture and manage runoff	Reduce amount of unmanaged runoff entering natural waterways
1.9	Incorporate and/or implement low-impact development design features, techniques, and/or practices to reduce water demand	Reduce amount of water used
1.10	Support appropriate recreational activities	Reduction in number of days where recreational activity is curtailed or diminished
Objective 2: Protect, restore, and/or enhance water quality		
2.1	Support compliance with current and future state and/or federal water quality standards	Reduction in number of violations of various standards
2.2	Improve the quality of urban runoff, storm water, and/or wastewater	Improvements in water quality sampling from project site
2.3	Reduce erosion and sedimentation	Reduction in volume of sediment and/or erosion from project site
2.4	Protect public and/or aquatic ecosystem health	Improvements in water quality sampling
2.5	Match water quality to water use	Identification and maintenance of appropriate water quality for specific use
2.6	Support appropriate recreational activities	Reduction in number of days where recreational activity is curtailed or diminished

Objective / Resource Management Strategy		Measurement
Objective 3: Provide stewardship of our natural resources		
3.1	Protect, restore, and/or enhance natural processes, habitats, and/or threatened and endangered species	Number of acres of project site and/or habitat being protected, restored, or enhanced
3.2	Protect, restore, and/or enhance ecosystems such as upland forests and meadows dependent on surface/shallow water supply	Number of acres of project site and/or habitat being protected, restored, or enhanced
3.3	Enhance recreational and/or educational opportunities	Number of days where recreational and/or educational activity is provided
3.4	Identify, develop, and implement efforts to better control invasive species	Number of acres or sites where invasive species are removed
3.5	Assess ecosystem health of watersheds in the region	Number of studies completed to increase understanding of ecosystem health
Objective 4: Maintain and enhance water, wastewater, and/or power generation infrastructure efficiency and reliability		
4.1	Systematically and strategically rehabilitate and replace aging water, wastewater delivery and/or wastewater treatment facilities in rural communities, including tribal lands	Number of facilities, including linear length of pipes, replaced and/or repaired
4.2	Ensure fire protection capacity	Volume of additional water provided
4.3	Improve energy efficiency of water systems and uses	Reduction in energy demand necessary for water systems
4.4	Promote use of water efficiency in power generating facilities	Reduction in energy demand of facilities
Objective 5: Address climate variability and/or reduce greenhouse gas emissions		
5.1	Increase understanding of water related greenhouse gas emissions	Number of studies completed to increase understanding of greenhouse emissions
5.2	Manage and modify water systems to respond to increasing climate variability	Number of projects completed
5.3	Use cleaner energy sources to move and treat water	Reduction in greenhouse gas emissions
Objective 6: Increase participation of small and disadvantaged communities in IRWM process		
6.1	Engage regional communities in collaborative water and natural resource related efforts	Number of participants attending public meetings; number of media communications

Objective / Resource Management Strategy		Measurement
6.2	Provide assistance for tribal and DAC consultation, collaboration, and access to funding for water programs and projects	Number of requests for assistance; number of consultations undertaken

Relationship to California Water Plan Update 2009 and Proposition 84 Guidelines

The IRWM Plan objectives and resource management strategies described above are in line with statewide priorities set forth by the California Water Plan (2009 Update) and the Proposition 84 Guidelines.

The California Water Plan lays out a roadmap for water management through the year 2030. This roadmap rests on seven pillars that include:

- Reduce Water Demand
- Improve operational efficiency and transfers
- Increase water supply
- Improve water quality
- Practice resource stewardship
- Improve flood management
- Other strategies

Where appropriate, these California Water Plan categories for integrated regional water management have been applied in the IRWM Plan process. The RWMG recognizes that various strategies are often connected to one another, as well as to other activities. As such, the IRWM Plan looks to find projects that help diversify the water management portfolio for the region as well as create positive synergistic effects that aid in improving the overall water and environmental condition.

The Inyo-Mono IRWM Plan process has been developed and implemented taking into consideration from the onset the Proposition 84 Plan Guidelines. The Inyo-Mono IRWM Plan is consistent with the intent of the Proposition 84 IRWMP Grant Program: to encourage integrated regional strategies for management of water resources and to provide funding for projects that protect communities from drought, protect and improve water quality, and improve local water security by reducing dependency on imported water.

Furthermore, the I-M IRWM Plan objectives and resource management strategies are consistent with the Proposition 84 Grant Program preference for proposals that:

- Include integrated projects with multiple benefits
- Support and improve local and regional water supply reliability, conservation, and efficiency

- Contribute expeditiously and measurably to the long-term attainment and maintenance of water quality standards, including the reduction of non-point source pollution
- Eliminate or significantly reduce pollution in impaired waters and sensitive habitat area
- Develop increased understanding of groundwater conditions and availability
- Undertake watershed protection and management activities, including ecosystem and fisheries restoration and protection
- Include safe drinking water and water quality projects that serve disadvantaged communities.

Relationship to California Water Plan Update 2009 Resource Management Strategies

Table 6-2. Relationship between CA Water Plan 2009 and I-M IRWM Resource Management Strategies

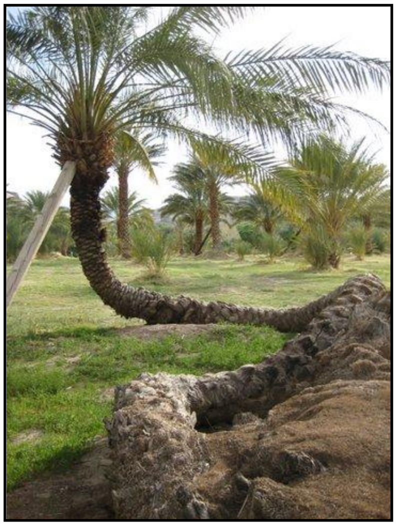
Resource Management Strategies		
State Water Plan Update 2009		Inyo-Mono IRWM Plan
Pillars	Resource Management Strategies	Resource Management Strategies addressed: Yes, No, Not Applicable (Identified from Table 7-1)
Reduce Water Demand	1. Agriculture Water Use Efficiency 2. Urban Water Use Efficiency	1. Yes 2. Yes
Improve Operational Efficiency and Transfers	1. Conveyance-Delta 2. Conveyance-Regional/local 3. System Reoperation 4. Water Transfers	1. Not Applicable 2. Yes 3. Yes 4. Yes

Resource Management Strategies		
State Water Plan Update 2009		**Inyo-Mono IRWM Plan**
Pillars	Resource Management Strategies	Resource Management Strategies addressed: Yes, No, Not Applicable (Identified from Table 7-1)
Increase Water Supply	1. Conjunctive Management and Groundwater Storage	1. Yes
	2. Desalination	2. Yes
	3. Precipitation Enhancement	3. Yes
	4. Recycled Municipal Water	4. Yes
	5. Surface Storage-CALFED	5. Not Applicable
	6. Surface Storage-Regional/Local	6. Yes
Improved Water Quality	1. Drinking Water-Treatment and Distribution	1. Yes
	2. Groundwater Remediation/Aquifer Remediation	2. Yes
	3. Matching Quality to Use	3. Yes
	4. Pollution Prevention	4. Yes
	5. Salt and Salinity Management	5. Yes
	6. Urban Runoff Management	6. Yes
Improved Flood Management	1. Flood Risk Management	1. Phase II Plan (addressed with Phase I projects)

Resource Management Strategies		
State Water Plan Update 2009		**Inyo-Mono IRWM Plan**
Pillars	Resource Management Strategies	Resource Management Strategies addressed: Yes, No, Not Applicable (Identified from Table 7-1)
Practice Resources Stewardship	1. Agricultural Lands Stewardship	1. Yes
	2. Economic Incentive	2. Phase II Plan (addressed with Phase I projects)
	3. Ecosystem Restoration	3. Yes
	4. Forest Management	4. Yes
	5. Recharge Area Protection	5. Yes
	6. Water-Dependent Recreation	6. Yes
	7. Watershed Management	7. Yes
Other Strategies	1. Crop Idling for Water Transfers	1. Yes
	2. Dewvaporation or Atmospheric Pressure Desalination	2. No/Not Applicable
	3. Fog Collection	3. No
	4. Irrigated Land Retirement	4. Yes
	5. Rainfed Agriculture	5. Yes
	6. Waterbag Transport/ Storage Technology	6. No

Chapter 7: Project Review Process

Introduction



For the initial Inyo-Mono IRWM Plan, a solicitation, review, ranking and proposal selection procedure was developed that addresses Prop. 84 Implementation requirements. A process involving several phases was established and approved by signatories to the Inyo-Mono IRWMP Memorandum of Understanding. The phases included:

Phase I: Establishing review and evaluation criteria: Criteria were established specific to Prop. 84 requirements, the California State Water Plan 2009 objectives, and approved Inyo-Mono regional objectives and strategies necessary to solicit, review, and rank project proposals to implement the Inyo-Mono IRWM Plan. To accomplish Phase I, a working group (Project Work Group) was convened comprising of Project Staff, members of the Coordinating Committee[5] and I-M RWMG participants with proposal writing and project review experience. To accomplish Phase I, extensive review of the relevant documents was completed, including project review criteria used by other IRWM regions. Once completed, the Project Work Group developed a series of questions that would guide the solicitation, review, and ranking process based on the outcome of Phase II.

Phase II: Procedure for soliciting, evaluating and ranking project proposals: The second phase consisted primarily of utilizing the outputs of Phase I to develop a procedure for soliciting, evaluating, and ranking project proposals. Emphasis in Phase II was placed on developing an iterative process which included enabling project proponents to submit pre-proposals, and based on initial eligibility criteria, determine next steps. If project proposals were deemed eligible, project proponents were asked for additional project information that would then be used to determine which project proposals would be approved by the RWMG and submitted to DWR. Phase II also included a procedure for members of the I-M RWMG to approve and rank project proposals, providing the basis for which projects were deemed highest priority.

Many criteria were considered in the project proposal review and ranking. These criteria included elements such as whether the project addresses Inyo-Mono IRWM Plan Objectives and Resources Management Strategies; adherence to Prop. 84 requirements; relationship to State Water Plan objectives; contribution to Disadvantaged Communities and Native American

[5] Phase I was completed prior to November 15, 2010, when the new MOU was adopted and in which the Coordinating Committee became the Administrative Committee.

Tribal entities; the project's relative readiness and technical feasibility, etc. These criteria were included as a means to ensure that projects meet minimum standards and align with state and regional priorities. Finally, a subjective criterion for ranking of projects was approved. The underlying rationale is that the Inyo-Mono RWMG is a strongly diverse group, and allowing the values represented in the Group to be reflected in the subjective ranking would thereby reflect the region (*e.g.*, local water purveyors may prioritize infrastructure needs; conservation groups may prioritize watershed management projects).

Review and ranking of project proposals was open to any of the Inyo-Mono RWMG members with the caveat that if a member decides to rank one project proposal, they must rank them all. The final ranking order for all project proposals was then determined based on the averaged ranking per project by all project reviewers[6]. Such an iterative procedure was deemed particularly important to avoid project proponents having to spend substantial amounts of time to develop a proposal that either did not meet minimal eligibility requirements and/or project ranking criteria. Phase II was led by Project Staff and members of the Project Work Group with guidance provided by the Administrative Committee.

<u>Phase III: Request for Proposals packet:</u> Phase III Consisted of integrating Phases I & II outputs into a single document to be used by prospective project proponents and reviewers as the basis for developing, submitting, reviewing, and ranking project proposals for Prop. 84 Round 1 Implementation funding. This document is known as the Inyo-Mono Integrated Regional Water Management Plan 2010 Request for Proposals [RFP]: IRWM Program Implementation Round 1 Grants (Appendix D). The RFP was created by Project Staff. The various worksheets developed in the RFP were used by the project proponents and staff to facilitate proposal development, determination of eligibility, and ranking. Once the RFP packet was complete, signatories to the Inyo-Mono MOU ranked all eligible project proposals. The final ranking was agreed upon by consensus at a publicly-noticed RWMG meeting.

<u>Phase IV: Implementation project submission:</u> This final phase involved final submission of full project proposals that were in full compliance with both Prop. 84 Implementation PSP requirements and that conformed to the Objectives and Resource Management Strategies agreed upon by the Inyo-Mono RWMG. The RWMG decided that should it receive only partial funding, the Group shall use the final project ranking as a basis for allocating available funds. Phase IV was a collaborative effort: complete project proposals were prepared by the respective project proponents, and the Implementation Proposal was prepared and submitted by Project Staff.

The iterative nature of the project solicitation, review, selection, and ranking procedure adopted by the Inyo-Mono RWMG provided for communication with both project proponents and with the larger participant group. This resulted in a more fully developed project review and submission process that gained the support of those involved.

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[6] For example, there were 25 project proposals submitted and 18 reviewers. The final ranking of projects consisted of all 25 projects with Project 1 receiving the highest average ranking and Project 25 receiving the lowest.

Chapter 8: IRWM Plan Implementation Projects

Introduction

In the first round of Proposition 84 Implementation funding, the Inyo-Mono RWMG is submitting a suite of projects to be considered for funding that range from water quality improvements to watershed protection to water infrastructure upgrades. A brief description of each project follows. The RWMG has also put together a list of other project needs that have not been submitted for Round 1 funding but may be considered by the Group in future implementation funding rounds (Appendix E). This list was developed after soliciting project ideas and brief project descriptions from all RWMG participants beginning in summer, 2009. These projects have not gone through the project review process by the RWMG, and many projects are still in the conceptual stages. The RWMG felt it was important, however, to include this list as an indication of additional priority needs that have been articulated by participants in the planning region.

Each of the projects being submitted for Round 1 Implementation funding integrates one or more regional water management objectives and strategies (see Appendix D). Emphasis was placed on projects that will exhibit multiple benefits and that will practice integrated water resources management through addressing the objectives deemed important by the RWMG. Thus, the projects included here range from feasibility studies to drinking water improvements for schools to watershed management to water infrastructure improvements. The short-term priorities for the Group (i.e., Round 1 funding) are to begin implementing the IRWM Plan objectives and strategies through projects focused on water quality and supply improvements, disadvantaged communities, Tribes, and small community water districts. Long-term, the I-M RWMG intends to implement projects to address all of the objectives and strategies that it has deemed important for the region.

<u>Round 1 Proposition 84 Implementation Inyo-Mono IRWM Plan Projects</u>

The Inyo-Mono RWMG is submitting 15 projects to be considered for Round 1 Implementation funding. Although the Group had initially evaluated 25 project proposals, 10 proposals were not completed for various reasons. Most conspicuously absent are three projects from Native American Tribal communities. Although these projects were highly ranked, the appropriate Tribal staff did not have the time, expertise, and/or other resources to complete the full project proposal. The 10 proposals have been added to the list of potential projects for future funding rounds (Appendix E).

The following project prioritization (1 being the highest ranking; 15 the lowest) will be used as the basis for determining allocation of funding after grant awards are announced; the project ranking will be subject to change at that time. The numbering of the Inyo-Mono Objectives for each project follows the format in Chapter 6 and Appendix D.

1. Safe Drinking Water and Fire Flow Feasibility Study for Tecopa, California

Inyo-Mono Objectives addressed:

(1) Protect, conserve, optimize, and/or augment water supply;
(2) Protect, restore, and/or enhance water quality;
(4) Maintain and enhance water, wastewater, and/or power generation infrastructure efficiency and reliability

Project proponent: Amargosa Conservancy

The community of Tecopa (including Tecopa Hot Springs), which is located in a desert area in remote Southeastern Inyo County, has no sources of potable drinking water. Although many households have domestic wells, water from the wells does not meet the State's safe drinking water standards for dissolved solids such as fluoride and arsenic. Currently, residents either drive 45 miles to purchase purified water, or they drink the well water—which subjects them to long term negative health effects. Moreover, during frequent power outages that plague these communities (especially during periods of high winds and intense summer heat) the existing wells cannot be operated.

In addition to lack of a potable water supply, this community lacks facilities to quickly refill fire-fighting apparatus used by the local volunteer emergency services district. Recent fires in the area have demonstrated the severity of this problem. At two recent community meetings, remedies for these two critical problems were identified as the top priorities for IRWMP-funded projects.

This proposal is to conduct a feasibility study of providing safe drinking water and establishing fire flow water storage facilities. The study will be conducted by a qualified, professional consultant. Regarding the water supply/water quality problem, instead of focusing on the delivery of potable water to every household, the study will analyze the feasibility of constructing public drinking water stations which would provide treated, potable water where residents could fill drinking water containers. Concerning the water fire water storage problem, the study will identify locations for above ground storage tanks for fire flow water that would best serve the two communities and identify the type of storage tanks that should be used.

The study will be conducted in collaboration with Inyo County and with the local fire protection district. The outcome of the study will be: (1) a brief description of the current problems, (2) recommended feasible solutions, (3) estimates of the costs of the recommended solutions (including needed engineering/design, required equipment, construction costs, and ongoing operation and maintenance costs), (4) identification of any property rights (and associated costs) that will need to be obtained, (5) a description of any permits and environmental documentation that will be required to implement the recommended solutions, and (6) recommendations on the entity that would operate and maintain the recommended solutions. When the study is completed, the Amargosa Conservancy and/or the local fire district will apply for a follow-up grant for the implementation of the project.

The project area is an economically depressed, low-income area, disadvantaged community with a high number of senior citizens on fixed incomes. The community's goal is to develop ecotourism—especially now that a portion of the Amargosa River which flows through the project area has been designated as America's first desert Wild and Scenic River. Accessible safe drinking water and adequate fire flow storage will improve the health and safety of the residents and visitors to the affected communities and will assist in attracting potential residents and businesses in this underserved and remote region of Inyo County.

Total project cost: $63,172

2. Coleville High School Water Project

Inyo-Mono Objectives addressed:
(1) Protect, conserve, optimize, and/or augment water supply;
(2) Protect, restore, and/or enhance water quality;
(4) Maintain and enhance water, wastewater, and/or power generation infrastructure efficiency and reliability;
(6) Increase participation of small and disadvantaged communities in IRWM process

Project Proponent: Eastern Sierra Unified School District

For over a decade, ESUSD has been working to comply with State Drinking Water Regulations. The drinking water at the Coleville campus, which is provided by two wells on site, has been deemed a public health hazard because of the elevated levels of naturally occurring uranium. The district has tried to mitigate this issue in various ways. Point-of-use reverse osmosis units were successful but could not be installed at all necessary locations. Currently the campus uses bottled water, which the state views as a sub-standard, nonpermanent fix.

The Coleville high school water project will meet the following objectives: (1) Reduce the levels of uranium to meet the State Drinking Water Regulations; (2) Install a water system that will insure that all buildings on the Coleville campus are provided with treated drinking water (including all potential points of use); (3) Isolate a majority of the campus irrigation from the treated water.

ESUSD will expect to see the following outcomes: (1) Safe drinking water for students, faculty, and visitors coming to the Coleville campus; (2) Increased storage capacities for potable water; (3) Increased conservation and efficiency for the campus irrigation through the use of variable frequency demand pumps; (4) Better fire protection.

Total project cost: $812,890

3. Water system upgrade to meet current standards at Round Valley School

Inyo-Mono Objectives addressed:
(1)   Protect, conserve, optimize, and/or augment water supply;
(2)   Protect, restore, and/or enhance water quality;
(4)   Maintain and enhance water, wastewater, and/or power generation infrastructure efficiency and reliability

Project Proponent: Inyo County

The Round Valley School is presently served by only one well. The well is shallow and the steel casing is deteriorating. Over the last two years the water system has failed three times, forcing the school to bring in porta-potties and bottled water, and creating the potential of closing the school due to the lack of water. Current state water standards require new systems to have redundant sources. The proposed project will drill a new well, providing a secondary source, and line the existing well with new casing. Additionally, the present system does not have capacity for fire protection and currently has less than 5% of minimal fire standard. We currently have 28 gallons per minute of capacity compared to the minimum fire standard of 500 gallons per minute for two hours.

Currently the school is forced to shut down when there are water outages due to failure of the current well. This project will allow school to continue even when there is no power supply to the school. Round Valley School is also an emergency evacuation site for both the American Red Cross and the residents of the power house located in the gorge operated by LADWP. Obviously, a reliable water supply is needed during emergency conditions, such as power outages, and that is what the project will provide to the local residents. Likewise, in case of a fire, the school does not have an adequate, sustainable water supply in order to protect the structure. This project will provide adequate water for structural fire protection.

Total project cost: $90,000

4. New Hilltop Well

Inyo-Mono Objectives addressed:
(1)   Protect, conserve, optimize, and/or augment water supply;
(4)   Maintain and enhance water, wastewater, and/or power generation infrastructure efficiency and reliability

Project Proponent: Wheeler Crest Community Services District

The Hilltop water system was installed in 1955 to service the first residents of the original Swall Meadows community. The system is now 55 years old and consists of a 6-gpm artesian well, a small underground reservoir, and approximately a mile of 1-1/4 inch plastic distribution lines. The system has no redundancy or back-up and can be shut down by any single-point failure.

The sections of plastic line are interconnected by barbed fittings and radiator clamps. The aging system is prone to distribution leaks and pathogenic failures. In 2010, the artesian well had a failure resulting in total loss of water to the community, with a subsequent bacterial contamination in the distribution system and emergency water having to be supplied under a boil order. The potable water supply was out for two weeks. Chlorinated, but non-drinkable, water was provided for sanitation purposes by filling the reservoir with the fire department water tender. The current system is beyond reasonable life expectancy and is subject to the vagaries of the artesian supply. The inherent flow of the well is extremely low and is dependent upon a siphon principle to produce 6 gpm. As shown with the artesian well outage this summer, the system's integrity is easily compromised by a simple plumbing leak.

The objective of this project is to drill a new well and install a small reservoir/pressure system within the community proper. The existing well and reservoir are located approximately 2500 feet and 1000 feet, respectively, from the community. The objective is to establish a new system within the community to augment the single-source artesian well, eliminating the dependence upon such a long supply line, thus greatly increasing water supply, reliability, and safety.

An engineering study on alternative designs to the current supply system has been completed, and a design has been selected which has undergone preliminary engineering and costing. Phases of the project will include drilling the new well, bringing in electrical power, and construction of a small tank and pressure system to connect with the existing distribution network.

A new, safer and more reliable water supply will be available to customers. Chances for bacterial contamination will be substantially reduced. Disinfectant insertion to, and monitoring of, the system will be substantially improved.

The Hilltop community consists of fourteen families. The district will also benefit from a lightened workload on the volunteers derived from a more reliable water system design.

Total project cost: $95,260

5. Well Rehabilitation – Phase I

Inyo-Mono Objectives addressed:
(1) Protect, conserve, optimize, and/or augment water supply;
(2) Protect, restore, and/or enhance water quality;
(4) Maintain and enhance water, wastewater, and/or power generation infrastructure efficiency and reliability;
(5) Address climate variability and/or reduce greenhouse gas emissions

Project Proponent: Mammoth Community Water District

The District uses both surface and groundwater to meet the community water supply needs. Surface water supply is limited by natural snow pack variability, storage capacity of Lake Mary, and fishery bypass flow criteria incorporated in the District's water rights permit and licenses. Groundwater supply is limited by the yield of production wells, and by naturally occurring contaminants. Arsenic, iron, and manganese are present at levels exceeding federal and state maximum contaminate levels (MCL). In 2006, the federal MCL for arsenic was reduced from 50 ppb to 10 ppb. As a result, the District violated the arsenic MCLs in early 2009. The groundwater also contains constituents such as phosphorous that inhibit effective removal of contaminants. Naturally occurring iron bacteria can plug the well screens and reduce yield over time. Because the District relies on groundwater for up to 75% of its supply during drought conditions, the reduction in groundwater supply due to inability to treat to standards and reduced yields has a significant negative impact on overall water supply reliability.

The District would like to determine whether isolating specific aquifer levels within key wells will reduce the contaminant level inputs from those geologic layers, while maintaining overall yield from the well. This will be done through vertical water quality and transmissivity testing, identification of primary contaminant sources within the aquifer levels, and blanking off the screen sections in these areas. If successful on the first two wells, the work would be continued to other wells in Phase 2.

The District will work with its hydrogeologist and the testing vendor to complete the well profiling. The two wells to be profiled collect water from multiple aquifer layers with different water qualities. The amount of water produced in the different layers is also variable and can be influenced by the transmissivity of the aquifer layers, pumping rates, depth of the pump intake and the condition of the perforations in the well. The results of the well profiling will confirm whether the water quality can be improved by sealing off sections that contribute the highest contaminant loading. The testing will also verify the most efficient pumping rate to minimize contaminant loading. Both wells have variable frequency drive motors (VFD's). The appropriate well sections will then be blanked off and the pumping rates adjusted as needed to minimize contaminant loading while optimizing the well yield.

The vendor and hydrogeologist used to conduct the well profiling and pump testing will provide a report on the results of the study. The ultimate deliverable will be installation of the blank screen sections and modified pump VFD settings. District customers will benefit from improved water quality. Well improvements will benefit ratepayers by minimizing the need to construct new water treatment facilities to remove contaminants. This project will benefit other water providers by providing an opportunity to use the District's study as a case study for their systems.

Total project cost: $200,000

6. Pump Operation Redundancy and SCADA Improvements

Inyo-Mono Objectives addressed:
(1) Protect, conserve, optimize, and/or augment water supply;
(4) Maintain and enhance water, wastewater, and/or power generation infrastructure efficiency and reliability;
(5) Address climate variability and/or reduce greenhouse gas emissions;
(6) Increase participation of small and disadvantaged communities in IRWM process

Project Proponent: Inyo County Department of Public Works

Inyo County owns and operates three community water systems serving the unincorporated towns of Laws, Independence, and Lone Pine. The combined population served by the water systems is approximately 2,000 people. The Lone Pine and Independence water systems are supplied by water from a well and gravity head storage tanks. A well and hydropneumatic storage tank supplies the Laws community water system. Transducers located at the tanks send high/low signals to the Supervisory Control And Data Acquisition (SCADA) system to operate the pumps. *Currently, there is no redundancy to activate the pumps should the transducers or SCADA system fail*. Laws, Independence, and Lone Pine are Disadvantaged Communities. Ratepayer revenues for Independence and Lone Pine cover Operations & Maintenance (O&M) but are insufficient to build capital reserves for upgrades. The County has had limited success raising the water rates. The Laws water system supplies water for only 14 ratepayers. Monthly revenues are too small to operate the system in the black. Inyo County subsidizes the system operation and maintenance costs.

This project will install secondary pressure sensor switches on each water system as a backup to energize and operate the well pumps and maintain system pressure in case of transducer or SCADA system failures. Secondary Auto-dialers are also included for operator notification redundancy. The project also will upgrade the SCADA systems to include capability to program off-peak pumping capability to save energy.

Total project cost: $81,200

7. CSA-2 Sewer System Upgrade Project

Inyo-Mono Objectives addressed:
(1) Protect, conserve, optimize, and/or augment water supply;
(2) Protect, restore, and/or enhance water quality;
(3) Provide stewardship of our natural resources;
(4) Maintain and enhance water, wastewater, and/or power generation infrastructure efficiency and reliability

Project Proponent: Inyo County Department of Public Works

The proposed project is located in Aspendell, served by County Service Area #2 (CSA-2), west of Bishop, bordering Inyo National Forest and USFS campgrounds. The County manages the system on behalf of the Aspendell residents. The project will replace 3,000 ft. of existing sewer main.

The system was installed in the late 1960s and consisted of a gravity sewer collector that discharged to a communal septic tank and leachfield. By the early 1970s the system began to exhibit various problems. In the mid 1970s an engineering study found that the leach field was poorly designed and the collector system had problems related to poor construction, hydraulics and inflow and infiltration (I&I).

In 1977 the USFS was ordered by the RWQCB to remove pit toilets located in nearby campgrounds to eliminate impacts to water quality. In 1978 the USFS constructed a treatment facility to serve the campgrounds. At that time, CSA-2 abandoned the community septic and leach field system and connected the existing sewer collection system to the USFS system.

The sewer collection system is now more than 40 years old, near the end of its useful life. Several hundred feet of the main need replacement due to reoccurring blockages and continuing I&I. Blockages occur from inconsistency of pipe diameters, uneven grade and root intrusion, and have resulted in overflow and spillage.

Bishop Creek is downgrade from the sewer system, and runoff from a spill has the potential to contaminate the creek. Seeping mains also may affect groundwater in wetland areas near the creek and likely produce non-point source pollution.

I&I are increasing as the system degrades and are impacting the treatment plant and increasing energy costs for treatment and reducing plant capacity, thereby resulting in rising costs charged to CSA-2. The USFS has complained about flow generated by the CSA-2 system.

The County intends to replace mains that have documented root intrusion or I&I first and then replace other portions of the system. Phase 1 will include approximately 3,000 feet of 6” mains, and manholes.

Total project cost: $485,716

8. Secondary Water Tank Construction

Inyo-Mono Objectives addressed:
(1) Protect, conserve, optimize, and/or augment water supply;
(2) Protect, restore, and/or enhance water quality;
(3) Provide stewardship of our natural resources;
(4) Maintain and enhance water, wastewater, and/or power generation infrastructure efficiency and reliability;
(5) Address climate variability and/or reduce greenhouse gas emissions;

(6) Increase participation of small and disadvantaged communities in IRWM process

Project Proponent: Birchim Community Services District

A secondary water tank is needed to back up the primary water tank: during maintenance, better manage water resources, and provide additional water supplies for fire suppression in the greater area of Sunny Slopes, Pine Glade and Rock Creek, Tom's Place, Rock Creek campgrounds and Highway 395.

Birchim Community Services District encompasses a small cluster of homes known locally as Sunny Slopes in southern Mono County 20 miles south of Mammoth Lakes and 25 miles north of Bishop. This is a very small, rural mountain community. The District provides domestic water service to 80 homes within the District. Presently the District has one water storage tank. This tank has corrosion issues which will cause leakage and erosion, and affect water quality. It needs to be drained for repairs and will need periodic draining for maintenance. The wells supplying the District produce aggressive water which is the source of the on-going corrosion. A secondary tank would allow the primary tank to be drained and repaired. These repairs and regular maintenance will significantly extend the life of the present tank.

The District is not located in a water basin. The level of the District wells varies during the year based upon the amount of water recharge. An additional storage tank would allow the District to pump and store water during periods when the well water level is high. This causes less stress on the wells, ensuring a longer well life, and less power needed to operate the pumps. This has the long-term beneficial effect of reduced power usage and a longer period before the drilling of an additional well will be necessary with the resulting energy and resource cost.

The District also provides emergency water service (through its fire hydrants) to the Long Valley Fire Protection District, U.S. Forest Service and California Division of Forestry fire fighting units for fire suppression in the extended area surrounding Sunny Slopes. An additional water storage tank not only provides immediate water availability but allows the District's pumps to continue pumping throughout the emergency and have additional water storage capacity.

The Long Valley Fire Department, Forest Service and CDF depend upon the fire hydrant system of the District to supply water for fire suppression in Sunny Slopes and the described surrounding areas as well as 20 miles along Highway 395. Because of the steep grade between Bishop and Tom's Place, overheated engines and vehicle fires are common. A secondary tank would provide much-needed water reserves for all of these purposes.

Construction of a secondary water storage tank would:

- Improve operational efficiency by allowing repair and regular maintenance of the existing tank to extend its useful life and prevent leaks and resulting erosion;
- Improve water quality by eliminating corrosion in the existing tank;
- Increase water supply by allowing the district to pump and store water during periods when the well levels are high, reducing stress on the wells and the water table;

- Practice resource stewardship by providing additional water to fight wildfires in a critical habitat as well as protect property and lives in a rural mountainous area;
- Reduce water demand by providing available fire fighting water near an area of intensive visitor use which would help early containment of a wildfire before massive amounts of men and material were needed.

Birchim Community Services District would benefit by being able to repair and maintain its existing water tank, improve water quality, extend its existing tank life, and increase water storage capacity. BCSD and surrounding community, Pine Glade, Rock Creek Tract, campgrounds, travelers on Highway 395, Toms Place store, restaurant and lodge, LADWP, U.S. Forest Service, would benefit by having additional water for fire fighting. The Long Valley Fire Protection District, Forest Service and CDF also benefit directly by having additional water resources at their disposal in fighting fires.

Total project cost: $99,000

9. Brackish Water Resource Study

Inyo-Mono Objectives addressed:
(1)   Protect, conserve, optimize, and/or augment water supply

Project Proponent: Indian Wells Valley Water District

In the Indian Wells Valley, groundwater is the only source of freshwater for the communities of Ridgecrest, Inyokern, Trona, Naval Air Weapons Station (China Lake), and numerous private wells of those living in local unincorporated areas. Recharge of the local aquifer is primarily from mountain front recharge from the Sierra Nevada range bordering the valley to the West. While scientists believe there is a great deal of water in the aquifer, not all of it is potable. Although the Indian Wells Valley Water District (IWVWD) is actively promoting water conservation, groundwater levels in the valley continue to decline. The need for alternative sources of potable water for the valley is inevitable.

The major objective of this project is to identify source areas in the valley for brackish water suitable for treatment. The treatment of brackish groundwater would provide a much needed new source of potable water for the Indian Wells Valley. This will improve water source reliability and contribute to the long-term benefits of this growing desert community.

An assessment of brackish water resources will allow the IWVWD to assess whether brackish water is a viable supplemental source of potable water for the valley. By utilizing water from the local aquifer, the IWVWD could significantly delay the need to import water from outside the valley.

Total project cost: $400,970

10. Laws and Lone Pine Tank Project

Inyo-Mono Objectives addressed:
(1) Protect, conserve, optimize, and/or augment water supply;
(4) Maintain and enhance water, wastewater, and/or power generation infrastructure efficiency and reliability;
(6) Increase participation of small and disadvantaged communities in IRWM process

Project Proponent: Inyo County Department of Public Works

Inyo County owns and operates the water systems serving the unincorporated towns of Laws and Lone Pine. The combined population served by the water systems is approximately 1,500 people. The Lone Pine water system is supplied by water from a well and gravity head storage tank. A well and hydropneumatic storage tank supplies the Laws community water system. Laws and Lone Pine are Disadvantaged Communities. Ratepayer revenues for Lone Pine cover Operations & Maintenance (O&M) but are insufficient to build capital reserves for upgrades. The County has had limited success raising the water rates. The Laws water system supplies water for only 14 ratepayers. Monthly revenues are too small to operate the system in the black. Inyo County subsidizes the system operation and maintenance costs.

The hydro-pneumatic tank in Laws is deteriorating and cannot reliably maintain system pressure. The manway hatch is showing signs of rusting out. The existing tank operates at 1,500 gallons. A 2,000 gallon fire truck can potentially drain the tank. An empty tank can introduce air into the water system resulting in water hammer that can severely damage the water system.

The tank in Lone Pine was constructed without a cathodic protection system. The tank internal access ladder is not galvanized and was not coated during construction. An inspection performed by a diver in 2008 observed that the ladder and tank are rusting.

The objectives of this project are to a) install a new 10,000 gallon hydropneumatic tank in Laws and b) replace the interior ladder, add cathodic protection system, and recoat the interior ladder and tank in Lone Pine.

Total project cost: $479,800

11. Water Meter Installation – Final Phase

Inyo-Mono Objectives addressed:
(1) Protect, conserve, optimize, and/or augment water supply;
(2) Protect, restore, and/or enhance water quality;
(3) Provide stewardship of our natural resources;
(4) Maintain and enhance water, wastewater, and/or power generation infrastructure efficiency and reliability

Project Proponent: June Lake PUD

In 2002, JLPUD adopted a water meter installation program for all existing commercial and residential properties for water conservation purposes in accordance with AB 1420 water meter compliance. We are in the final phase of this effort. By installing water meters for commercial and residential customers, we have found that the overall water usage has been reduced by approximately 32 percent since 2002. Customers who were paying a flat rate fee are now on a tiered rate system and are more conscious of the amount of water they are using. Additionally, the JLPUD established a Water Management Program, ordinance 2008-01, dated January 9, 2008, that promotes reduced water consumption through consumer awareness and involvement.

The objectives of this project are to provide stewardship of our natural resource; protect, restore and enhance water quality; and protect, conserve, optimize and augment water supply in the Mono Basin. One of the major effects that the implementation of water meters has on consumption is how much they can curb overall water usage. Environment Canada research has found that flat rate customers use 50 to 60 percent more water than metered customers. The 1999 research by Environment Canada found that households paying for water by volume (i.e., metered) used approximately 288 liters per person per day. Households paying a flat rate for water used 433 liters per person per day.

Total project cost: $348,000

12. Lone Pine, Independence and Laws Water Meter Project

Inyo-Mono Objectives addressed:
(1)   Protect, conserve, optimize, and/or augment water supply;
(2)   Protect, restore, and/or enhance water quality;
(3)   Provide stewardship of our natural resources;
(4)   Maintain and enhance water, wastewater, and/or power generation infrastructure efficiency and reliability;
(5)   Address climate variability and/or reduce greenhouse gas emissions;
(6)   Increase participation of small and disadvantaged communities in IRWM process

Project Proponent: Inyo County Department of Public Works

Inyo County owns and operates three community water systems serving the unincorporated towns of Laws, Independence, and Lone Pine. The combined population served by the water systems is approximately 2,000 people. The proposed project will replace residential analog meters with automatic electronic read meters and renovate the Town Demand Meters. Laws, Independence, and Lone Pine are Disadvantaged Communities. Ratepayer revenues for Lone Pine and Independence cover operations and maintenance but are insufficient to build capital reserves for upgrades. The county has had limited success raising the rates. The Laws water system supplies water for only 14 ratepayers. Monthly revenues are too small to operate the system in the black. Inyo County subsidizes the system operation and maintenance costs. The aging analog meters were installed in the 1970s and are no longer accurate and produce unreliable readings for billing. The Town Demand meters have not been certified in ten years. The Independence Town demand meter is not turning freely and under reporting flows.

The proposed project will replace the residential analog meters with automatic electronic read meters and renovate the Town Demand Meters. The project will provide for accurate measurement of individual water usage and efficient monitoring of the town's gross water demand. The improvements will provide better accounting and billing information and promote water conservation. Converting to automatic electronic read meters will reduce meter reading time from 10 days to 3 days, providing for more efficient operations and reduced costs.

Total project cost: $550,200

13. Wastewater Treatment Plant Upgrades - Phase 1

Inyo-Mono Objectives addressed:
(1) Protect, conserve, optimize, and/or augment water supply;
(2) Protect, restore, and/or enhance water quality;
(3) Provide stewardship of our natural resources;
(4) Maintain and enhance water, wastewater, and/or power generation infrastructure efficiency and reliability

Project Proponent: June Lake PUD

Our wastewater treatment plant has been in service for over 35 years and is in need of the upgrades identified below to enhance the treatment process. Currently we do not have a screening device at the head works. Screens are used in wastewater treatment to strain larger particles from the water stream and are usually the first components in the treatment system. The main objective of using a screen is to remove materials and large objects that could damage or cause blockage to downstream equipment, reduce the overall effectiveness and reliability of the treatment processes and ultimately contaminates the final discharge waterway.

The objectives of this project are to protect and restore surface water and groundwater quality into the Mono Basin to safeguard public and environmental health and to secure water supplies for beneficial uses.

Total project cost: $537,395

14. Inyo/Mono Watersheds Invasive Weed Control Project

Inyo-Mono Objectives addressed:
(1) Protect, conserve, optimize, and/or augment water supply;

(2) Protect, restore, and/or enhance water quality;
(3) Provide stewardship of our natural resources

Project Proponent: Inyo County

This project aims to control and eradicate invasive weeds including Perennial pepperweed *(Lepidium latifolium)*, Canada thistle *(Cirsium arvense)*, Spotted knapweed *(Centaurea maculosa)*, Yellow starthistle *(Centaurea solstitialis)*, Scotch thistle *(Onopordum acanthium)*, and Russian knapweed *(Acroptilon repens)* that threaten the Owens, East Walker, and West Walker River watersheds. This biological pollution inflicts many adverse effects on watersheds including:

- Water issues such as increased erosion leading to increased sedimentation, lowered quality and decreased flood control capacity
- Native habitat issues such as lowered species diversity, damaged native plant communities and compromised wildlife habitat
- Working landscape impacts such as lowered property values and a threatened local agricultural economy
- Fire issues including changes in fire regimes and increased fire severity
- Air quality issues such as increased dust events leading to public health impacts
- Recreation impacts such as impediments to access, and aesthetic degradation.

The objective of this project is to protect watersheds in Inyo and Mono counties by reduction of current weed populations to levels at which eradication of individual populations is feasible. Quantitative goals include at least 25% reduction of weed populations that currently encompass 33,136 gross acres. This project will employ an integrated pest control approach and best management practices to control invasive plant species for the benefit of our local population, recreationalists, those receiving water exports from Inyo and Mono counties, and the local native plant and wildlife communities. The Eastern Sierra Weed Management Area (ESWMA) group will collaborate with and contribute to this project. ESWMA includes:

- Inyo and Mono Counties Agricultural Commissioner's Office
- Inyo County Water Department
- Inyo National Forest
- Humboldt - Toiyabe National Forest
- Bureau of Land Management Bishop Field Office
- Bureau of Land Management California Desert District
- Los Angeles Department of Water and Power
- California State Parks
- California Department of Food and Agriculture
- California Department of Transportation District 9
- CalFire
- Natural Resource Conservation Service

- Inyo/Mono Resource Conservation District
- Inyo/Mono Cattleman's Association
- Bishop Paiute Tribe

Total project cost: $461,257

15. Town of Mammoth Lakes Stormwater Master Plan Development and Implementation

Inyo-Mono Objectives addressed:
(1) Protect, conserve, optimize, and/or augment water supply;
(2) Protect, restore, and/or enhance water quality;
(3) Provide stewardship of our natural resources

Project proponent: Town of Mammoth Lakes

Much of the infrastructure in the Town, including roads and drainage facilities, were built by Mono County prior to the incorporation of the Town in 1984. During this time there was minimal emphasis placed on erosion control, water quality, or facility design. As a result, the Town is now dealing with serious erosion issues, inadequate drainage facilities, numerous flood-prone areas, and a lack of water quality improvements. Several large storm events in 2006 and 2007 highlighted the existing problems in the Town and caused excessive erosion of slopes and ditches, flooding of Town facilities and private property, and discharged sediment and other pollutants to Hot Creek and Mammoth Creek. As a small community, the Town has limited resources available to address the numerous stormwater, erosion, drainage, flooding, and water quality problems which exist, but the Town is fully committed to tackling the problem. As an example of the Town's commitment to this effort: in 2007, with $70,000 of our own funds (plus hundreds of hours of staff time), the Town commissioned an investigation of stormwater-related issues. The investigation focused on high-priority areas, but due to the limited available funding, only a small portion of the town was evaluated. The investigation included field evaluations, mapping, and review of existing programs and policies. The project had two important deliverables, including a December, 2007, Existing Conditions Report and an April, 2008, Final Recommendations Report. Although focused on only a small portion of the town, the project was highly successful, and the Final Recommendations Report provided the Town with clear direction on proposed management strategies, project considerations, and most importantly, the need for the Town to develop a Stormwater Master Plan.

This grant request is being submitted to build upon our previous successes and includes two important elements:

> 1) Development of a Stormwater Master Plan which provides a comprehensive strategy and guides the Town's decisions related to the issues presented above;
>
> 2) Immediate implementation of critical components of the Plan, including delineation of projects for inclusion in the Capital Improvement Program project list and development

of management strategies and policies to address property owned by the federal and State government and by private entities.

Total project cost: $507,000

Chapter 9: Inyo-Mono IRWM Plan Implementation

Introduction

Creating an effective IRWM Plan requires an understanding of the regional surroundings, demographics, and water related issues. The planning effort also must take into consideration ongoing planning efforts, data, and planning gaps, and combines all the information into a coherent and comprehensive planning tool. With such an understanding, an effective IRWM Plan then develops objectives and strategies for management of and planning for water resources. As importantly, to effectively implement an IRWM Plan, regions must create a willingness and desire on the part of community stakeholders and regional decision-makers to work together in a collaborative manner. The Inyo-Mono IRWM Plan is an effective plan and it is ready for implementation.

Relation of Inyo-Mono IRWM Plan to local water and land use planning

IRWM Plans are by nature long-term planning efforts. Fundamental to creating an effective IRWM Plan is identifying and consulting existing plans within the region to leverage ongoing efforts, minimize redundancies, and create synergies amongst and between relevant stakeholders. Moreover, in order to maximize the potential opportunity to address water-related needs in a region, an IRWM planning effort needs to be keenly aware of and integrate other planning efforts, as well as legally binding agreements that currently are in place.

Since early in the Inyo-Mono planning process, the Project Staff has strived to reach out to relevant stakeholders throughout the planning region with the primary goal of engaging as many interested community members in the Inyo-Mono planning process as desired. Project Staff was also aware of the extensive planning efforts that were completed and implemented or that were in the development process within the planning region. Thus, a second goal of broad stakeholder engagement was to acquire, first-hand, knowledge of past, existing, or future planning efforts in the region. With such information, Project Staff ensured that the development and implementation of the Inyo-Mono IRWM Plan *will integrate, complement, and support such planning efforts.*

Working together, Project Staff, consultants, members of the Inyo-Mono RWMG, and involved participants have endeavored to collect as many documents relevant to the Inyo-Mono planning region as possible. In doing so, this effort has resulted in a significant number of planning documents being acquired, reviewed and summarized (Appendix F). These documents include a wide array of planning efforts, legally binding agreements, regulations, and mandatory requirements. They also address issues both pertinent to land and water resources and planning. *Fundamental to the Inyo-Mono planning effort is the opportunity to more effectively integrate water and land-use planning.* The process of reviewing existing planning efforts, combined with extensive discussions amongst all involved in the Inyo-Mono planning effort, has facilitated a process of integrating information from such efforts into the development of goals, objectives, and resource management strategies relevant to the Inyo-Mono planning region (see Chapter 6).

The Inyo-Mono IRWM Plan does not knowingly conflict with any existing plan or legal agreement. Moreover, to ensure that the Plan does not conflict with plans that may be developed in the future, Project Staff will seek out and review such plans on a regular basis. Doing so will ensure the Inyo-Mono IRWM Plan integrates and remains complimentary to new plans well into the future.

One significant outcome of the planning effort thus far has been the opportunity to increase and leverage collaborative and integrated planning and implementation efforts to address water related needs in the region. This has occurred primarily as a result of regularly convened meetings of the IM-RWMG. Such meetings facilitate discussions about existing planning efforts (water- and/or land-specific) as well as how the Inyo-Mono IRWM planning effort can support identified needs. Additionally, the Inyo-Mono planning effort has provided an opportunity to bring together an array of stakeholders having diverse expertise and mandates. This integration has proven to be very productive in terms of coordinating planning needs and developing strategies to address ongoing planning as an element of the Inyo-Mono IRWM Plan.

Analysis of impacts and benefits of Plan implementation

The I-M RWMG is committed to ensuring that the IRWM Plan is consistent and compatible with existing planning documents and in particular established agreements and legal obligations. Rather than confounding the present legal and regulatory environment, the IRWMP is intended to streamline and improve stakeholders' ability to operate and succeed within the current regulatory environment. Moreover, participants in the Inyo-Mono RWMG recognize the value in the Inyo-Mono IRWM planning effort in that it affords an opportunity for regional coordination and collaboration throughout the planning region itself. Indeed, the wide array of members (see Chapter 5 for a description of involved stakeholders) has committed to participating in the Inyo-Mono IRWM process as a means to leverage collaborative opportunities in order to realize efficiencies and multi-agency and topical benefits. Table 9-2 provides a summary of the expected impacts and benefits derived from the development and implementation of the Inyo-Mono IRWM Plan.

Table 9-2. Impacts and benefits of Plan implementation

Inyo-Mono IRWMP Objectives	**Inyo-Mono Region**	
	Potential Impacts	**Potential Benefits**
Protect, conserve, optimize, and/or augment water supply	• Habitat degradation • Construction related delays or impacts to water supply or quality • Financial liability for long-term project management	• New water supply systems • Increased reliability of water supply systems • Additional water supply via water conservation measures
Protect, restore, and/or enhance water quality	• Habitat degradation • Construction related delays or impacts to water supply or quality • Financial liability for long-term project management	• Improved water quality • Improved aquatic and wetland habitats • Improved recreational opportunities • Improved human health within region • Improved health of regional flora and fauna
Provide stewardship of our natural resources	• Human and financial resource burden(s)	• Restoration of ecosystem processes • Increased ecological resilience • Improve long-term services provided by regional resources • Improved health and viability of regional habitats • Improved health of regional flora and fauna • Improved recreational opportunities • Improved regional socio-economic conditions
Maintain and/or enhance water, wastewater, and power generation infrastructure efficiency and reliability	• Financial liability for long-term project management	• Increased reliability of water supply systems • Improved energy efficiency • Reduced potential for wastewater contamination • Reduced operational costs
Address climate variability and/or reduce greenhouse gas emissions	• Financial liability for long-term project management • Construction related delays or impacts regional resources do to new, more efficient infrastructure and energy source • Increased demand for water to support "green" technology/renewable energy sources	• Improved climate change adaptability • Reduction of greenhouse gas emissions
Increase participation of small and disadvantaged communities in IRWM process	• Time burden	• More comprehensive understanding of the needs of DAC and Tribal entities • Improved ability to address water needs of DACs and Tribal entities • Improved of human and resource capacity

The above-mentioned impacts and benefits will be reviewed throughout the Plan's duration. Based the progress of the implementation of the Inyo-Mono IRWM Plan, the impacts and benefits may be revised to reflect lessons learned, achieved milestones, and to document any unforeseen impacts or benefits to date.

Chapter 10: Coordination

Introduction

Beginning with the formal launch of the Inyo-Mono IRWMP effort, Project Staff has made a concerted effort to coordinate with entities directly involved with the planning effort as well as regional neighbors and state and federal agencies. A brief description of the main coordinating activities that have taken place thus far and plans for future coordination among stakeholders directly involved in the planning effort, neighboring IRWM regions, and state and federal agencies is provided below.

Coordination of activities within the IRWM region

As noted in Chapter 1, the Inyo-Mono IRWM planning effort was launched in early 2008 with the intent of bringing together as many interested stakeholders involved with water as possible and to facilitate coordination amongst these stakeholders throughout the region. The goal in establishing broad-based coordination amongst participating agencies and stakeholders was to ensure issues and concerns pertaining to water are addressed during the planning process. Moreover, a significant amount of time amongst those involved with the Inyo-Mono RWMG has been invested to create an environment of transparency, respect, and equality for all participants “at the table”. Such an upfront investment in the Inyo-Mono planning process has contributed to the avoidance of conflicts and a desire to productively collaborate in a manner necessary to achieve stated objectives. Coordination of these efforts, in addition to water management projects and activities of involved stakeholders, has primarily been via direct communications with representatives of stakeholder groups. These have included, but are certainly not limited to:

- Coordination of regularly convened RWMG meetings, to a lesser degree meetings of the Coordinating Committee/Administrative Committee, and as needed, ad-hoc workgroups. To date, the Inyo-Mono Regional Water Management Group has convened more than 25 meetings.
- Coordination and convening of more than 20 outreach meetings convened within the region with target audiences including such entities as County Supervisors, Regional Planning Advisory Committees, specific stakeholder groups, Central Nevada Regional Water Forum, etc.

- Coordination of the completion and approval of the Inyo-Mono Region Acceptance Process.
- Coordination and the completion of both the initial Launch Phase MOU and subsequently the Planning and Implementation MOU.
- Coordination of the completion and submission of, and subsequent recommended awarding of, the Inyo-Mono Planning Grant Application.
- Coordination of the completion, approval and submission of the Phase I Inyo-Mono Integrated Regional Water Management Plan.
- Coordination of drafting Prop. 84 draft guideline comments on behalf of the Inyo Mono RWMG.
- Coordination of proposal development pursuant to funding opportunities supporting regional natural resources management (*e.g.*, Department of Conservation Watershed Coordinator opportunity).

Future activities requiring coordination within the Inyo-Mono IRWM region comprise primarily:

- Implementation of projects receiving Prop. 84 Implementation funding
- Revising the initial Inyo-Mono IRWM Plan per the Planning Grant application
- Revising the Inyo-Mono MOU
- Preparation of Round 2 Prop. 84 Project Implementation proposals

It is the intent of the Inyo-Mono RWMG and Project Staff to complete the future coordination tasks listed above prior to August, 2012, funding permitting. Moving forward, Project Staff will also consider past, current, and future projects implemented by members of the Inyo-Mono RWMG when revisiting goals, strategies, objectives, and actions necessary to address regional water needs. To do so, Project Staff intends to maintain similar coordination strategies that have already been employed and proven successful while adhering to an adaptive management strategy as needed. In all cases, it is anticipated that the Inyo-Mono RWMG will work together to leverage water-related expertise within the region and maximize the opportunity to coordinate water management projects and the needs of all involved.

Identification of and coordination with neighboring IRWM regions

In July, 2008, Inyo-Mono IRWMP staff met in Sacramento with DWR-IRWMP staff to initiate formal communications between the two parties. During the same meeting, it was recommended that a coordinated effort with other IRWM planning efforts in the Sierra region be pursued. In particular, coordinating efforts with all other adjacent IRWM planning efforts in order to ensure agreement regarding potential common boundaries, overlapping of boundaries between proposed IRWMPs, and gaps between existing and proposed IRWMPs was important. Since the initial meeting with DWR, the Inyo-Mono RWMG has made a concerted effort to reach out and collaboratively approach issues associated with boundaries, gaps, and overlap with the several other existing and emerging IRWMP efforts in the region as well as lay the groundwork for future collaboration on shared water resource issues (Figure 3-1).

The initial effort began with a meeting of representatives from several existing or beginning IRWM planning efforts in the region (Table 10-1). The purpose of this meeting was to initiate a dialogue amongst the various IRWMP RWMGs and to begin focusing a discussion specific to boundary related issues. During the initial meeting it was also agreed by those participating that further coordination would take place. Moreover, it was determined that the Inyo-Mono IRWMP RWMG would take the lead in coordinating such efforts. As noted in Table 10-1, numerous meetings have been formally convened. In addition to formal meetings, a plethora of email and phone communications with representatives from other IRWMP regions has taken place. As a result of the actions taken, agreements between the Inyo-Mono RWMG and all other IRWMP RWMGs having a common boundary, or an overlap, have been formalized through Letters of Agreement.

Table 10-1. Meetings between Inyo-Mono RWMG and other Regional Water Management Groups to ensure regional coordination.

Date	IRWMP/Agency	Meeting Type
August, 2008	Inyo-Mono, Tahoe-Sierra, Southern Sierra, Antelope Valley, Mojave, Lahontan RWQCB Rep.	In person-Mammoth Lakes
September, 2008	Inyo-Mono, Kern, Southern Sierra, Antelope Valley, Mojave and Lahontan RWQCB Rep.	Conference call
October, 2008	Inyo-Mono, Antelope Valley, Sierra Nevada Alliance	Conference call
October, 2008	Inyo-Mono, Kern, Antelope Valley, Southern Sierra	Conference call
November, 2008	Inyo-Mono, Kern, Antelope Valley, Southern Sierra	In person-Sacramento
December, 2008	Inyo-Mono, Madera, National Park Service-Devils Post Pile, Sierra Nevada Alliance	Conference call
February, 2009	Inyo-Mono, Antelope Valley, Mojave	Conference call
March, 2009	Inyo-Mono, Antelope Valley, Mojave, Southern Sierra, DWR(phone)	In person-Ridgecrest
March, 2009	Inyo-Mono, Southern Sierra, Madera, Mammoth Mountain Ski Area	Conference call
April, 2009	Inyo-Mono, Antelope Valley, Mojave, Lahontan	Conference call

Formal agreements now exist between the following IRWM planning efforts:

Inyo-Mono: Tahoe-Sierra IRWM: This boundary is based on watershed delineation which also coincides very closely to county jurisdictional lines. There were no outstanding issues needing to be resolved to reach agreement.

Inyo-Mono: Tuolumne/Stanislaus IRWM: This boundary is based on watershed delineation (the Sierra crest) which also coincides with county lines. There were no outstanding issues needing to be resolved to reach agreement.

Inyo-Mono: Madera IRWM: This boundary is based on watershed delineation (the Sierra crest). It also coincides with county lines with the exception of the National Park Service (NPS) Devils Post Pile National Monument (DEPO). DEPO is located within Madera County and therefore has been included in their IRWM planning boundaries. However, access to DEPO originates from and all staff working for the NPS resides within Mono County. For this reason, discussions with staff from Inyo-Mono and Madera IRWMPs as well as DEPO were convened on two occasions to develop a strategy to address this situation. The outcome of these discussions is that both Inyo-Mono and Madera IRWMPs will collaboratively work together to address water-related issues as both programs advance. It may be that eventually a Memorandum of Understanding is established between the two regions.

Inyo-Mono: Mammoth Mountain Ski Area: Southern Sierra IRWM: Madera IRWM:
Mammoth Mountain Ski Area (MMSA) operates under a Special Use Permit administered by the Inyo National Forest. The permit area encompasses 3,500 acres within Mono and Madera Counties. These areas include portions of the Inyo-Mono, Madera and Southern Sierra IRWM regional boundaries. As with the DEPO arrangement, the permitted use area belonging to the MMSA will be considered an area of shared interest and all parties have agreed to collaboratively work together to address water-related issues in the future.

Inyo-Mono: Southern Sierra: This boundary is based on watershed delineation (the Sierra crest) which also coincides with county lines. However, as with the Madera IRWMP, a small portion of DEPO is found within the South Sierra's proposed boundary. The approached employed with Madera regarding the issue of DEPO was also employed between the Inyo-Mono and Southern Sierra regions.

Inyo-Mono: Kern IRWM: This boundary is based on watershed delineation (the south Sierra crest). Although a small portion of the Inyo-Mono planning area includes the northeast portion of Kern County, based on this area being within the larger watershed comprising the southern portion of the Inyo-Mono planning region, it has been agreed this portion of Kern County will be included in the Inyo-Mono planning area.

Inyo-Mono: Mojave IRWM: This boundary is based on watershed delineation and does not follow county jurisdictional boundaries. However, the proposed boundary does overlap with the northern portion of Mojave's. Mojave's northern boundary is based on the Mojave Municipal Water District's jurisdictional boundaries. In acknowledging this overlap, both the Mojave and Inyo-Mono RWMGs have agreed to work collaboratively to address issues of common interests in this area as both regions advance their respective efforts. This agreement is confirmed by the signed Letter of Agreement between the Inyo-Mono and Mojave representatives.

Central Nevada Regional Water Authority:

The Central Nevada Regional Water Authority (CNRWA) is an eight-county unit of local government in the State of Nevada that collaboratively and proactively addresses water resource issues common to the nine counties. The CNRWA exists under Nevada's Interlocal Cooperation Act and has delegated authority separate and apart from its member counties. The Authority has a 21-member board of directors appointed by the county commissions of the eight counties involved. The CNRWA members are Churchill, Elko, Esmeralda, Eureka, Lander, Nye, Pershing and White Pine Counties. These counties cover approximately 65 percent of Nevada's land area. Within California three counties are involved, two of which, Mono and Inyo, border Nevada and are actively engaged in the Inyo-Mono IRWM process (Lassen County is the third county). Inyo-Mono IRWMP staff attended both 2009 and 2010 annual meetings: during the 2010 Inyo-Mono Project Staff participated in a panel discussion in which the Inyo-Mono IRWM planning effort was presented. The intent of participating in these meetings primarily centers on developing relationships with relevant Nevada Counties and in the future, coordinating with such counties on issues of mutual interest. A secondary objective of participating in the annual meetings is to continually broaden our network of interested stakeholders and engage them in pertinent planning related issues. It is anticipated that the Inyo-Mono RWMG will continue to be actively involved in future annual meetings.

IRWMP Roundtable of Regions:

The IRWMP Roundtable of Regions is comprised of representatives from other planning regions throughout the state, some of which are representatives of neighboring planning regions. The goal of the Roundtable of Regions is to provide a forum of interested stakeholders involved with IRWM efforts to discuss issues of concern, provide assistance to one another, and more basically provide facilitation and coordination among state-wide planning efforts. Conference calls are the primary form of communication among participants of the Roundtable of Regions with calls occurring approximately on a quarterly basis. From the beginning of the Roundtable of Regions, Inyo-Mono Project Staff have regularly participated in scheduled calls, providing information on the regional planning efforts and soliciting input from representatives from other planning regions.

Existing Gaps

The only gap that now exists between the Inyo-Mono and other IRWM planning regions is that of Fremont Valley and northern portions of San Bernardino County. A brief description of how the Inyo-Mono RWMG proposes to address these gaps is found below.

Fremont Valley:

The proposed southwestern boundary of the Inyo-Mono IRWMP follows the watershed boundary of the Indian Wells Valley and the Fremont Valley. Additionally, the Fremont Valley is situated within Kern County, bordered by the Antelope Valley IRWMP, the Mojave IRWMP and the Southern Sierra IRWMP. Currently, the Inyo-Mono IRWM planning region is significant in size, mostly rural, with issues unique to the areas within the proposed boundaries. Therefore, based upon the watershed boundaries, political considerations, common interests, and capacity, there is little logic for the Fremont

Valley to be included within the Inyo-Mono IRWM planning region. It is the recommendation of the I-M RWMG that interested parties from the Fremont Valley pursue inclusion in the Antelope, Kern, Mojave or Southern Sierra IRWMPs.

Northern San Bernardino County:
The currently proposed Inyo-Mono southern boundary is based on a watershed delineation and does include a small portion of northern San Bernardino County. Because of this limited inclusion of San Bernardino County, attempts have been made to reach out to representatives of San Bernardino. Contacts for San Bernardino have been included in our electronic mailing lists for quite some time and are believed to be receiving all information distributed. However, there has been very little response to our communications to date. Based on limited information, it is the understanding of the Inyo-Mono IRWMP staff that plans to launch an IRWMP effort in San Bernardino are being considered. At this time, very little detail about this effort is known. It is the intent of the Inyo-Mono RWMG to continue to reach out to representatives of San Bernardino County and fully expect that if and when they decide to launch an IRWM planning effort, a collaborative approach will be established and implemented.

At present, there are no known ongoing water management conflicts with neighboring IRWM regions. Moving forward, coordination with neighboring IRWM planning regions is expected to continue per the commitments made thus far. Future coordination will be achieved through direct communications amongst the various planning regions as well as communicating via several efforts in which Inyo-Mono Project Staff are currently involved as discussed in the next section.

Coordination with agencies

A concerted effort has been made to reach out to relevant agencies involved in water planning activities, particularly the California Department of Water Resources and the Lahontan Regional Water Control Board. To this end, Project Staff communicate on a regular basis with these agencies' staff regarding Inyo-Mono's regional needs and planning efforts. Developing communications with these entities has facilitated an opportunity for productive dialogue between the Inyo-Mono Project Staff and agency staff tasked with implementing Proposition 84 IRWMP requirements. Establishing rapport with DWR agency staff in particular has provided opportunities for Project Staff to seek guidance and issue specific clarifications when needed. Doing so has been of critical importance given the limited resources of the Inyo-Mono planning region. DWR personnel who have attended I-M RWMG meetings have been most beneficial for guidance and support. In turn, the Inyo-Mono RWMG has raised its profile with DWR and has worked to make the region-specific issues and challenges apparent to DWR staff.

The Inyo-Mono planning region is the second largest planning region in the state, comprising of more that 10% of the state of California and more than 50% of the Lahontan region. Comprised of numerous small and rural communities, the planning region is constrained by very small water agencies and community service districts as well as numerous small non/not-for profit organizations (NFPOs) having limited financial and human resources. In many cases the limited size of the communities, local agencies, and NFPOs has proven to be extremely challenging in meeting the requirements of state agencies and in particular, CA DWR's Prop. 84 requirements, which are largely based on circumstances associated with regions more heavily populated or with large infrastructure. Project Staff and Inyo-Mono RWMG participants have taken a proactive role in trying to address the local needs specific to the Prop. 84 IRWMP program through such activities as submitting comments to draft Prop. 84 Guidelines, participating in State-sponsored public workshops, and as noted above, developing direct communications with DWR staff. Project Staff is intent on enhancing the capacity of the planning region to address our local conditions and specific needs. However, to do so adequately, working more closely with agencies such as DWR and the Lahontan Regional Water Quality Control Board (RWQCB) is necessary. With respect to implementing the Inyo-Mono IRWM Plan and more specifically addressing future project needs, there are three areas of support which could prove beneficial.

> First, within the context of addressing potential regulatory requirements, many of the entities involved in the Inyo-Mono IRWM effort do not have extensive experience (in some cases none at all) with the California Environmental Quality Act (CEQA) or the National Environmental Quality Act (NEPA). At a minimum, some level of CEQA compliance is required for any projects receiving CA state funding. Given this requirement, specific assistance enabling participating entities to identify specific levels of CEQA required and the processes to complete the determined CEQA requirements would be beneficial. Moreover, given the extent of federally managed lands in the Inyo-Mono planning region, assistance specific to identifying and addressing NEPA requirements would also be beneficial to potential project proponents.
>
> Second, there is relatively limited capacity on the part of smaller water districts, community service districts, disadvantaged communities, and NPOs to adequately complete the economic feasibility analysis requirements as presented in the Prop. 84 Implementation Project Solicitation Package. Specific economic-related guidance and supporting materials provided by agencies such as DWR would enable such entities to develop more complete and more competitive proposals in future funding rounds.
>
> Third, as the Inyo-Mono RWMG begins to revise its Phase I plan and additional needs to address climate change related issues are required, direct assistance in terms of data requirements, data sources, and methods for analyses will be important.

For the types of assistance noted above to be effective, it is important for State agency personnel to implement a strategy that includes providing expertise remotely, such as being available for webinars, phone and email communications, as well as traveling to specific regions to better understand the context of a given setting and the stakeholders involved. An underlying principle that should be adhered to by agencies and regional planning efforts is to not assume a template approach to coordination with each region. Each region has unique needs and constraints. Building regional capacity to address future needs is of critical importance to ultimately have longer-lasting impacts on livelihoods and natural resources within the region.

Lastly, a challenge that has been realized by the Inyo-Mono Project Staff and involved stakeholders is the timing related to the preparation and implementation of Prop. 84 IRWMP guidelines and associated funding to support IRWM efforts throughout the State. In the case of the Inyo-Mono IRWM effort, resources necessary to complete the Region Acceptance Process, the Planning Grant application, and the initial IRWM Plan have been extremely limited. Such limited resources in turn have hindered certain aspects of the planning effort from being completed as desired. To avoid such challenges in the future, and to assist limited-resource planning regions, closer coordination amongst various State agencies and divisions within certain agencies such as DWR could be improved to ensure schedules and associated funding support is available. In a related manner, improved coordination between the California legislature and agencies required to implement legislation (*e.g.* DWR) is necessary to more effectively and efficiently realize intended outcomes that ultimately become the responsibility of local and/or regional entities. More specifically, coordination involving required actions and dates in which actions are to be adhered to at the regional and county levels need to be improved in order for local agencies to be able to adequately respond to new mandates.

Chapter 11: Plan Performance and Monitoring

Introduction

Fundamental to successfully implementing the Inyo-Mono IRWM Plan is the means to monitor and evaluate progress. Doing so allows the IM-RWMG an opportunity to determine whether the short and long-term goals and objectives are being achieved. Developing and implementing a monitoring and evaluation protocol provides an opportunity to modify elements of the Plan based on an adaptive management approach. The following sections provide information relative to (1) performance measures to be developed for evaluating the Plan's implementation, (2) entities to be involved in, and timing associated with, evaluation activities, (3) the development of project monitoring plans, and (4) how information derived from monitoring and evaluation activities will be used.

Performance measures and entity(ies) responsible for IRWM Plan implementation evaluation, project-specific monitoring plans and activities

Plan implementation evaluation

The Inyo-Mono IRWM Plan implementation will be evaluated based on the use of performance measures, quality assurance procedures, and through periodic assessments (proposed to be conducted on at least a semi-annual basis). These evaluation approaches are to be based primarily on performance measures (performance monitoring). Performance monitoring will be employed with the intent of monitoring the performance of management actions and in doing so, monitor the success of the Inyo-Mono IRWM Planning effort[7]. In particularly, performance of

[7] Much of the proposed monitoring actions are derived from those developed for the Cosumnes-American-Bear-Yuba (CABY) IRWM Plan. In reviewing the CABY IRWM Plan, and given the many similarities between the two planning

management monitoring will be established enabling an objective evaluation of the Inyo-Mono IRWM Plan relative to established objectives and resource management strategies agreed upon by members of the I-M RWMG.

In the initial process of implementing the Inyo-Mono IRWM Plan, a series of measures and/or indicators will be developed that are linked to the agreed upon objectives of the Inyo-Mono IRWM Plan. These, at a minimum will include three types of performance indicators: 1) administrative indicator; 2) output indicators, and 3) outcome indicators. A description of the three types of performance indicators above are provided below.

- Administrative indicators will be used to evaluate progress being made by the Inyo-Mono Project Staff, Phase I Fiscal Agent, project proponents, and others that may be responsible for supporting the implementation of the Phase I Plan. Indicators yet to be determined may include, but will not be limited to, such metrics as the number of Planning and Administrative Committee meetings convened, the number of targeted outreach meetings convened, timeliness of project reporting and administrative obligations, and the amount of funding secured in support of Phase I Plan implementation.

- Output indicators will be used to measure the overall progress associated with implementing the Phase I Inyo-Mono IRWM Plan. Output indicators will closely correspond to how projects are achieving their intended goals. Specific indicators may include such things as the number of replaced wells, the number of infrastructure improvements specific to improving water quality, the number of water conservation initiatives implanted, the number of acres reclaimed from invasive species, and the progress of the project in relation to its schedule.

- Outcome indicators will include indicators that evaluate either in a quantitative or qualitative manner the effects of projects that implement the Phase I Inyo-Mono IRWM Plan. Outcome indicators may include such metrics as the quantity of reclaimed water, the acre feet of water conserved via a water conservation initiative, the amount of water quality that was improved, and the amount of native vegetation restored.

Each of the proposed performance indicators will be used to more broadly evaluate progress being made by the Inyo-Mono RWMG, provide relevant information necessary to facilitate an adaptive management strategy, and provide relevant information needed to keep the general public and policy makers informed as to the success, challenges, and shortfalls of the Inyo-Mono IRWM planning effort.

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regions, the proposed monitoring actions within the CABY IRWM Plan are considered to be applicable to the Inyo-Mono IRWM Plan as well. As such, the I-M RWMG would like to acknowledge the efforts of those involved with the CABY planning effort.

Specific indicators relevant to evaluating the Phase I Inyo-Mono IRWM Plan will be developed during the first quarter of the Plan's implementation. *Three main entities will be responsible for developing specific indicators as well as evaluating the overall effectiveness of the Phase I Inyo-Mono IRWM Plan.* They are: Inyo-Mono Project Staff, Phase I Fiscal Agent personnel, and a workgroup to be made up of RWMG members and participants. Combined, these entities will serve as members of an Evaluation Work Group to be established at the onset of the Plan's implementation.

Project specific monitoring plans and activities

Per the requirements of Prop. 84 Implementation PSP, each project proponent is to include in its proposal submission specific information with respect to monitoring, assessment, and performance measures (Worksheet 6). For each of the projects that are awarded funding, the monitoring, assessment, and performance measures will provide the basis for a monitoring plan necessary to evaluate progress being made towards the Plan's implementation. Such evaluations will be conducted by the Evaluation Work Group described above.

Frequency of evaluating RWMG performance in Plan implementation

The frequency for evaluating the Inyo-Mono RWMG performance for the Phase I Inyo-Mono IRWM Plan will be dictated primarily by reporting requirements set forth within final contracts established among funding sources and recipients - the CA Department of Water Resources and/or other funding entities, the Fiscal Agent responsible for administering Implementation funding, and project proponents themselves. It is anticipated that evaluations will be initiated approximately six months after the Plan's implementation.

Data management system for tracking implementation performance

Based on the various performance measures agreed upon by the Inyo-Mono RWMG and approved monitoring plans, a database will be created to house all Plan and project implementation monitoring and evaluation information. This database and a mechanism to allow for tracking implementation performance will be developed in a manner consistent with the information provided in Chapter 12 (Data Management and Technical Analysis).

Process for lessons learned to be implemented in future Plans

The I-M RWMG firmly believes in an active adaptive management approach to developing and implementing future plan(s). As such, it is the intent of Project Staff and others involved with the Evaluation Work Group to utilize the information derived from monitoring and evaluation of the Phase I Inyo-Mono IRWM Plan implementation in a manner that facilitates modifications necessary to ensure projects achieve their intended objectives. In addition to monitoring and evaluation of specific projects, Project Staff will coordinate with members of the Evaluation Work

Group and the Administrative Committee on a quarterly basis to assess progress relative to the Plan's implementation, including progress made towards revisions to the Inyo-Mono Phase I IRWM Plan. Doing so on an iterative basis and at regular intervals will enable Project Staff an opportunity to modify strategies and approaches as needed.

Timing of development of project-specific monitoring plan

Project proponents are required to provide information in their project proposals specific to monitoring, assessments, and measures enabling evaluations of projects to be conducted. Working collaboratively with the Evaluation Work Group, project proponents will implement necessary monitoring plans based on the prescriptions within each monitoring plan and on regularly established schedules.

Required contents of project-specific monitoring plan

In accordance with the requirements of Prop. 84 Implementation Guidelines, the following information is to be included within each project proposal:

- Project goal(s)
- Desired outcome(s)
- Output indicators (measures to effectively track output)
- Output indicators (measures that evaluate change that is a direct result of the work)
- Measurement tools and methods
- Targets (measurable targets that are feasible to meet during the life of the proposal)

In addition to the requirements above, project proponents have the opportunity to incorporate additional elements in a given monitoring plan. While each project proponent will need to meet the minimum requirements described in the Prop. 84 Implementation Guidelines, they are not required to incorporate additional monitoring elements unless it is determined by the Evaluation Work Group and agreed to by project proponents that doing so is feasible and will benefit the outcome of the project and the implementation of the Inyo-Mono IRWM Plan.

Chapter 12: Data Management and Technical Analysis

Data needs within the IRWM region

Although not all data needs from RWMG participants have been identified, it has been recognized that increased monitoring of both surface water and groundwater is necessary to better understand status and trends. Monitoring of both quantity and quality is needed, and it is important to develop and support long-term monitoring programs. In addition, each individual project has its own data collection and management needs.

Description of data collection techniques and contributing data to data management system

To date, no water-related data have been specifically collected to support IRWM Plan implementation. As the Inyo-Mono RWMG moves into the implementation phase, staff will work to encourage collaboration and communication among organizations to help standardize data collection techniques when possible. State and federal programs, such as the California Statewide Groundwater Elevation Monitoring (CASGEM) program, will help by providing guidance in developing data collection standards. Where and when appropriate, RWMG member organizations will be encouraged to share data with each other and to provide data to a centralized data management system.

Thus far in the Inyo-Mono IRWMP, mostly qualitative data have been collected and managed by Project Staff. These data include: RWMG participant information, meeting attendance, meeting summaries, maps, photos, outreach efforts, and other RWMG activities and informational documents. Project Staff has developed and maintains a database for RWMG participant contact information and affiliation, as well as e-mail lists for the RWMG, the Administrative Committee, and project proponents. Contact information and e-mail lists are updated as needed, and detailed notes are used in the contact information spreadsheet to explain why a contact has been removed from the list or why a new contact has been added, as well as any other pertinent information about that contact.

Geospatial data have been mostly provided and utilized by RWMG participants providing in-kind GIS expertise. The maps that have resulted from this work are maintained digitally in .pdf and .jpeg formats; however, IRWMP staff does not currently possess all the files used to create the maps and has identified a need to improve the geographic data management for the I-M IRWMP in the Planning Grant work plan.

Entity responsible for maintaining DMS

I-M IRWMP staff will be responsible for the management and analysis of relevant data, including the development of a comprehensive database necessary to house all future data needs.

Description of QA/QC measures

The owner of any data being input into the data management system, whether it is the individuals who collected the data or other representatives from the organization, will be provided with opportunity to verify the accuracy and quality of the data entered into the data management system. Outputs of the data management system will be provided to project managers on a regular basis for individual review and evaluation of the Plan's progress and accuracy.

Description of how data will be shared

Data will be shared in a variety of ways. Most often, data will be shared in the form of spreadsheets or other documents electronically via email or a website. During future Plan revisions, the Inyo-Mono website will continually be updated, and it is the intention of staff to create a password-protected page on the website where Members and stakeholders can access information and data.

Description of data management system, including how data are shared and made compatible with State and federal databases

Currently, the data management system resides on the computers of IRWMP staff. The need for extensive data analysis has been minimal thus far, so the storage of data on personal computers has been manageable. It is expected that more data and technical information will be collected and used in the development of the Phase II Plan as well as in the implementation of Round 1 projects. At that time, the needs for the data management system will be reconsidered and the system will be modified as necessary.

Similarly, there has not yet been a need for the RWMG to share data with other databases, such as with State and federal agencies. Those methods and practices will be developed as the need arises. Within the region, many entities, from water agencies to County governments, are responsible for providing their own data to larger databases. In the future, the IRWMP program can assist smaller water districts and disadvantaged communities in determining which data they need to collect and share and can provide technical guidance on the mechanics of making data available. One example is the CASGEM database as described above.

Technical information and analyses used to develop water management needs for the Plan

To date, there has not been a need for technical analysis related to I-M IRWM planning activities. Such information and analyses will be addressed on as-needed basis in order to address regional needs as well as regulatory requirements.

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Chapter 13: Finance

Introduction

The Inyo-Mono IRWM planning effort has, from its inception, been challenged with funding constraints. Funding constraints emanate from the very limited number of large, well-funded water-related entities in the region, the preponderance of disadvantaged communities, and the rural nature of the region itself.

To date, funding to support the Inyo-Mono planning effort has primarily comprised of financial support from California Trout, Inc. and a pre-planning grant awarded by the Sierra Nevada Conservancy. In addition, several contributions have been provided RWMG participants. A full breakdown of direct cash contributions provided thus far in support of the Inyo-Mono IRWM planning process is provided in Table 13-1.

Table 13-1. Provision of cash funds to support the Inyo-Mono IRWMP: 2008-present

Source	Amount
California Trout, Inc.	$55,000
Sierra Nevada Conservancy	$49,600
Indian Wells Water District	$ 7,500
Mammoth Community Water District	$ 5,000
Mammoth Mountain Ski Area	$ 3,500
Sierra Nevada Alliance	$ 3,000
Bishop Paiute Tribe	$ 2,000
National Park Service (Devils Post Pile)	$ 2,000
June Lake Public Utilities District	$1,000
Mono Lake Committee	$ 500

Inyo-Mono IRWM Project Staff has had to be both frugal and resourceful thus far in the planning process. With such limited funding and as a result of the commitment on behalf of members of the I-M RWMG, the Inyo-Mono planning effort has achieved a great deal, including providing a foundation for long-term planning and cooperation, extensive outreach and engagement of stakeholders throughout the region, successful completion of the Inyo-Mono Region Acceptance Process and most recently, the completion and submission of the Inyo-Mono Planning Grant Application. In addition, Project Staff and RWMG participants completed the Phase I Inyo-Mono IRWM Plan without the assistance of Prop. 84 planning grant funding.

Known and possible funding sources, programs, and grant opportunities

Moving forward, Project Staff and members of the I-M RWMG will embark on a revision of the Phase I Inyo-Mono IRWM Plan with funds requested in the Planning Grant application. These funds will support the next iteration of work aimed at revising and updating, among other things, the Project Review Process; revisiting current goals, objectives, and resource management strategies; and establishing a long-term regional entity to implement Inyo-Mono IRWM Plans over the course of the next two decades. The Phase II Inyo-Mono IRWM Plan is anticipated to be complete roughly 12 months after the Planning Grant funding is made available. Specific descriptions of the tasks, associated budgets, including expected sources of funding to support the revision to Phase I Inyo-Mono IRWM Plan, are provided in Table 13-2.

In addition to revising the Phase I Plan, implementation of the Plan itself will require funding. Such expenses are incorporated into the Implementation Grant application based on allowable expenses identified in the Implementation PSP.

Project Staff will continue to pursue a diverse portfolio of funding opportunities to support the long-term needs of the Inyo-Mono IRWM planning effort. Doing so will not only include pursuing funding opportunities identified in Prop. 84 but will also include pursuing funding as needed from a range of local, state and federal sources, private individuals, foundations, and Inyo-Mono RWMG members themselves. Developing a long-term (five-year timeframe) funding strategy to support the long-term operations of the Inyo-Mono planning effort will be part of the revision (as part of Task 3 in Table 13-2) process undertaken for the Phase II Inyo-Mono IRWM Plan.

Table 13-2. Project description and budget for Phase II Inyo-Mono IRWM Plan, from September, 2010, Planning Grant application

Task	Description	Match Amount: Match source	Grant	Total	% Match
1	Enhance and Maintain Inyo-Mono IRWMP Collaborative Process & Stakeholder Involvement	$15,578: CalTrout ($4,498)/RWMG member agency($11,080)	$75,000	$90,578	17%
2	Update all relevant planning documents and processes in the Inyo-Mono Region	$2,500; RWMG member agency	$7,500	$10,000	25%
3	Re-evaluate governance and organizational structure for Inyo-Mono IRWMP	$1,000; RWMG member agency	$9,000	$10,000	10%
4	Incorporate Climate Change into the Inyo-Mono IRWM Plan and Develop Climate Change Adaptation Strategies	$1,000; RWMG member agency	$10,000	$11,000	9%
5	Conduct Region-Wide Outreach to Refine Phase I Issues, Goals, Objectives, and Strategies	$6,000 RWMG member agency	$40,000	$46,000	13%

Task	Description	Match Amount: Match source	Grant	Total	% Match
6	Solicit & Evaluate Phase II Projects from Inyo-Mono Planning Region	$44,460: Sierra Nevada Alliance ($9500)/Chaten-Brown and Carstens ($24,960)/Rural Water Association ($5,000)/RWMG Member agency ($5,000)	$36,419	$80,879	55%
7	Develop Draft Inyo-Mono IRWMP Phase II, including prioritized projects	$14,000; RWMG member agency	$26,000	$40,000	35%
8	Review and evaluate draft Inyo-Mono IRWMP Phase II with RWMG	$5,000; RWMG member agency	$21,000	$26,000	19%
9	Develop and Submit Final Inyo-Mono IRWMP, Phase II	$2,000; RWMG member agency	$11,000	$13,000	15%
10	Maintain and Enhance Inyo-Mono IRWMP Website, GIS, and Communication Tools	$2,500/Bishop Paiute Tribe	$1,696	$4,196	150%
	Totals	**$94,038**	**$237,615**	**$331,653**	**28%**

Funding mechanisms, including water enterprise funds, rate structures, and private financing options, for projects that implement the IRWM Plan

Below is a brief presentation of certain types of funding mechanisms that are relevant to project proponents and the implementation of the Phase I Inyo-Mono IRWM Plan. In addition, a brief description of the California Finance Coordinating Committee (CFCC) is provided. Appendix G contains specific funding mechanisms and opportunities sponsored by members of the CFCC. The mechanisms and opportunities provided in Appendix G are potential sources of financing supporting implementation of the Phase I Inyo-Mono IRWM Plan, as well as future iterations of the Inyo-Mono IRWM Plan.

Water Enterprise Fund

Water enterprise funds are generally used to account for operations that are financed and operated in a manner similar to private enterprises, with the intent being that costs of providing goods or services to the general public on a continuing basis be financed or recovered primarily through user charges. The fund commonly includes:

1) **Water Enterprise Utility Fund** - accounts for activities relating to the operation of the Districts water system including water distribution and treatment.
2) **Water Capital Projects** - used to account for costs associated with large capital projects of the water fund.

3) **Water Impact Fees** - accounts for connection charges paid by new users of the water system. Fees collected are to be used for future impacted Water System Capital Improvements.

Financial capacity: Rate Structure

Financial resources of a water system include but are not limited to the revenue sufficiency, credit worthiness, and fiscal controls. It is necessary for a water system to have a budget and enough revenue coming in to cover costs, repairs, and replacements. Financial capacity recommendations include the following:

1. Revenues from drinking water sales should cover all public/private water system costs for the system including operating costs, maintenance costs, debt service costs, operating reserves, debt reserves, emergency equipment replacement reserves, and revenue collection costs. Capital improvement funding for facilities needed for upgrading the existing system should come from revenue from water sales or other sources of capital. Rates should be set accordingly.

2. New connection fees, development fees, and other funding sources should cover all public water supply capital improvements costs for facilities needed for expanding the system for new customers. Fees should be set accordingly.

3. All drinking water generated revenues should be used for drinking water purposes. For public water systems owned by entities that provide other services in addition to drinking water, drinking water purposes should include equitable share of administrative costs for the entire entity.

Bridge Loans: Revolving Loan Fund

The National Rural Water Association Revolving Loan Fund (RLF) was established under a grant from United States Department of Agriculture and Rural Utilities Services to provide financing to eligible utilities for pre-development costs associated with proposed water and wastewater projects. RLF funds can also be used with existing water/wastewater systems and the short term costs incurred for replacement equipment, small scale extension of services or other small capital projects that are not a part of your regular operations and maintenance. Systems applying must be public entities. This includes municipalities, counties, special purpose districts, Native American Tribes and corporations not operated for profit, including cooperatives, with populations up to 10,000. For more information, interested parties can go to: http//www.nrwa.org/revolvingloan.htm.

The California Financing Coordinating Committee

The California Financing Coordinating Committee (CFCC) was formed in 1998 and is made up of seven funding agencies: six state, and one federal. CFCC members facilitate and expedite the completion of various types of infrastructure projects by helping customers combine the resources of different agencies. Project information is shared between members so additional resources can be identified. CFCC members conduct free Funding Fairs statewide each year to educate the public and potential customers about the different member agencies and the financial and technical resources available.

A list of water project related funding mechanisms relevant to project proponents of the Inyo-Mono IRWM planning effort is provided in Appendix G.

Certainty and longevity of known or potential funding

As noted above, the Inyo-Mono IRWM Project Staff submitted a Planning Grant Application in September, 2010. Planning Grant funds will be utilized primarily to support revision to the Phase I Inyo-Mono IRWM Plan in addition to supporting overall Plan implementation. This funding will provide the means for Project Staff and the Inyo-Mono RWMG to focus on developing a long-term financing strategy in 2011-2012. Due to the limited resources and rural nature of the Inyo-Mono planning region, financial security is a perpetual challenge. However, all project proponents are committed to securing funding necessary to implement the Phase I Inyo-Mono Plan.

Operation and maintenance costs for projects that implement the Inyo-Mono Phase I IRWM Plan and the certainty of operation and maintenance funding

As part of the Inyo-Mono Request for Proposal document (Appendix D), prospective project proponents were asked to provide information specific to how long-term management of a given project will be ensured. Included in this request is the expected means to address operation and maintenance expenses. As such, there is not one single source, strategy or plan to address operation and maintenance costs for all projects that implement the Inyo-Mono Phase I Plan. Instead, coordination of the various projects will involve financial monitoring and evaluation of progress being made (see Chapter 11). Monitoring and evaluation of projects will include the status of securing necessary operation and maintenance expenses.

Project Staff and members of the Inyo-Mono RWMG will continue to pursue necessary funding to support operation and maintenance costs for projects that implement the Plan on behalf of those entities, particularly those supporting disadvantaged and tribal communities, needing such assistance.

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Chapter 14: Summary and next steps

The Phase I Inyo-Mono IRWM Plan represents a culmination of almost three years of meetings, discussions, planning, researching, and writing. It is the intention of the Inyo-Mono RWMG that this document becomes a resource for those looking to learn about water resources in the Inyo-Mono region, much as one might pick up a book about the Owens Valley or Mono Lake to learn about those areas and the related issues. In addition to thoroughly describing the region's varied characteristics, this Plan also comprehensively describes the history of the Inyo-Mono IRWMP, the composition of the RWMG, its governance structure, and outreach efforts. This document also looks to the future, however, and describes how the Plan will be implemented, lists projects being submitted for Round 1 Implementation funding as well as projects that may be submitted in future funding rounds, and discusses logistics of Plan implementation, such as data management and financing.

The Inyo-Mono RWMG is eager to begin implementing the Phase I Plan. The immediate next step is to submit a suite of projects for funding under the Round 1 Implementation request for proposals, due in early January, 2011. Once funding is awarded, the Group can begin implementing in the Plan in earnest. In the meantime, the Group will continue to build on its successes thus far by continuing to convene meetings and draw stakeholders together into discussions of common interest. In addition, revisions to the Phase I Plan will begin in early 2011 with the awarding of the Planning Grant. Although there is much work to be done, the Group has been able to take a step back to revel in its successes to date. The efforts of the Inyo-Mono RWMG have resulted in a foundation from which water planning and management in the region can be proactive and productive in the decades to come.

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Appendix A: Inyo-Mono RWMG Active participants and Stakeholders

Agency/Organization Name	Stakeholder Category	Role in Inyo-Mono IRWMP	Level of participation	Pre-planning MOU signatory	Planning/ Implementation MOU signatory	Agency/organization mission/objectives
Amargosa Conservancy	Environmental Stewardship Organization	RWMG	High	X	X	A non-profit organization dedicated to protecting the land, water and beauty of the Amargosa and Death Valley area.
Ash Meadows National Wildlife Refuge; U.S. Fish and Wildlife Service (NV)	Federal agency	RWMG	Low			Ash Meadows National Wildlife Refuge is located in southern Nevada 90 miles northwest of Las Vegas. Encompassing over 23,000 acres of spring-fed wetlands, Ash Meadows is a desert wetland ecosystem providing habitat for at least 25 species found nowhere else in the world.
Benton Paiute Reservation	Native American Tribe; Disadvantaged community	RWMG	Low			The Utu Utu Gwaitu Paiute Tribe (Benton Tribe), are a federally recognized tribe located on the Benton Paiute Indian Reservation, which is 160 acres in size. The Benton Reservation sits in Blind Springs Valley in Mono County, California between Benton Valley and Adobe Valley, near Benton Hot Springs.
Big Pine Paiute Tribe	Native American Tribe; Disadvantaged community	RWMG	High	X	X	The Big Pine Paiute are a federally recognized tribe located on the Big Pine Reservation, which is 279 acres in size. Big Pine sits at the eastern base of the Sierra Nevada in the high desert of Owens Valley.
Birchim Community Services District	Water purveyor	RWMG; legal counsel	High	X	X	Serves Sunny Slopes
Bishop Paiute Tribe	Native American Tribe; Disadvantaged community	RWMG; Administrative Committee	High	X	X	The Bishop Paiute Tribe is a federally recognized tribe with Treatment as a State status and EPA-approved Water Quality Standards. The Bishop Paiute Reservation is located on approximately 900 acres in Bishop, California.
Breeze-Martin Consulting	Local business	RWMG	Low			A consulting firm that provides technical assistance in strategic planning, economic, and community development projects.
Bridgeport PUD	Local water purveyor		Low			Serves Bridgeport, CA

Agency/Organization Name	Stakeholder Category	Role in Inyo-Mono IRWMP	Level of participation	Pre-planning MOU signatory	Planning/ Implementation MOU signatory	Agency/organization mission/objectives
Bridgeport Ranchers Association	Agricultural organization		Low			
Bureau of Land Management (Bishop office)	Land use authority; federal agency	RWMG	High	X	X	The BLM manages multiple resources and uses such as energy and minerals, timber, recreation, and fish and wildlife habitat.
California Department of Fish and Game	State agency	RWMG	Medium			The Mission of the Department of Fish and Game is to manage California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public.
California Native Plant Society - Bristlecone Chapter	Environmental stewardship organization	RWMG	Medium			The California Native Plant Society (CNPS) is a state-wide non-profit organization of lay persons and professionals who share an interest in California's native plants. The Society, working through its local chapters, seeks to increase the understanding of California's native flora and to preserve this rich resource for future generations. Membership is open to all.
California Rural Water Association	Advocacy and technical assistance	RWMG	Medium			Mission statement: To meet the needs of member water and wastewater systems by providing quality information, training and technical assistance and legislative representation, and assist them in maintaining a high standard of service to their communities.
California Trout	Environmental Stewardship Organization	RWMG; Project Staff	High	X	X	California Trout is a state-wide non-profit organization working to protect and restore wild trout and steelhead waters throughout California. Mark Drew of Cal Trout is the pre-planning project manager for the I-M IRWM process, and oversees all aspects of the work necessary to complete the grant proposal.

Agency/Organization Name	Stakeholder Category	Role in Inyo-Mono IRWMP	Level of participation	Pre-planning MOU signatory	Planning/ Implementation MOU signatory	Agency/organization mission/objectives
Central Nevada Regional Water Authority	Advocacy organization	Planning Committee	Low			The Central Nevada Regional Water Authority (CNRWA) is an eight-county unit of local government that collaboratively and proactively addresses water resource issues common to communities in Nevada's rural interior. CNRWA exists under Nevada's Interlocal Cooperation Act and has delegated authority separate from its member counties.
Central Sierra Resources Conservation and Development Council	Environmental Stewardship Organization; Community organization	RWMG; Administrative Committee	High	X	X	A local organization created to increase the conservation of natural resources, support economic development, enhance the environment and standard of living in local communities.
City of Bishop	City government	RWMG	Low			Bishop is a city in Inyo County, California, USA. The population was 3,575 at the 2000 census. The town was named after Bishop Creek, flowing out of the Sierra Nevada: the creek was named after Samuel Addison Bishop, a settler in the Owens Valley.
Crowley Lake Mutual Water District	Local water purveyor	RWMG	Low			Serves Crowley Lake, CA
Eastern Sierra Audubon Society	Environmental Stewardship Organization	RWMG	Medium	X	X	The Eastern Sierra Audubon Society's mission is to foster a deeper appreciation of wild birds and their habitats, reaching out to youth through education, and providing a community through monthly presentations and field trips.
Eastern Sierra Land Trust	Environmental Stewardship Organization	RWMG	High	X	X	The Eastern Sierra Land Trust is a nonprofit organization that works with willing landowners to protect vital lands in the Eastern Sierra for their scenic, recreational, historical, agricultural, botanic, watershed and wildlife values.
Eastern Sierra Unified School District	Education Organization	RWMG	Medium		X	Educational excellence in a quality environment. Serves northern Mono County

Agency/Organization Name	Stakeholder Category	Role in Inyo-Mono IRWMP	Level of participation	Pre-planning MOU signatory	Planning/ Implementation MOU signatory	Agency/organization mission/objectives
Fort Independence Indian Reservation	Native American Tribe	RWMG	Medium		X	360 acres of land adjacent to Oak Creek in Independence California. In 2000, the Tribe received an additional 200 acres through the California Indian Land Transfer Act for a total of 560 acres. The membership consists of 136 tribal members of which approximately half live on the Reservation and the rest reside elsewhere in the Unites States from coast to coast.
Friends of the Inyo	Environmental Stewardship Organization	RWMG	High	X		A non-profit conservation organization dedicated to preserving the Eastside's unique qualities: its diverse wild lands, scenic beauty, wild rivers, varied flora and fauna, and abundant opportunities for low-impact sustainable recreation.
Humboldt-Toiyabe National Forest	Federal agency	RWMG	Low			The Humboldt-Toiyabe's spectacular 6.3 million acres makes it the largest national forest in the lower 48 states. Located in Nevada and a small portion of eastern California, the Forest offers year-round recreation of all types.
Independence CSD	Local water purveyor	RWMG	Low			Serves Independence, CA
Indian Wells Valley Cooperative Groundwater Management Group	Local water agency	RWMG	Low			A Cooperative Groundwater Management Plan was agreed to in 1995 resulting in a Groundwater Management Group consisting of representatives of ten signatories.
Indian Wells Valley Water District	Local water agency	RWMG	High	X	X	Indian Wells Valley Water District was formed as a County Water District in 1955 and operates pursuant to County Water District Law (California Water Code sections 30000 et seq.). It has just under 12,000 connections that serve almost 30,000 people. Its jurisdiction encompasses 38 square miles which includes all of the city of Ridgecrest except that portion which is on the Naval Air Weapons Station. It also serves small parts of Kern and San Bernardino counties.

Agency/Organization Name	Stakeholder Category	Role in Inyo-Mono IRWMP	Level of participation	Pre-planning MOU signatory	Planning/ Implementation MOU signatory	Agency/organization mission/objectives
Inyo County Water Department/Inyo County	Local water agency; Disadvantaged community	RWMG; Administrative Committee	High	X	X	The Inyo County Water Department monitors and reports on the conditions of the vegetation, soils, and hydrology of the Owens Valley. This information is used by Inyo County and the Los Angeles Department of Water and Power to jointly manage the water resources of the valley and protect the valley's environment while providing a reliable water supply to the City of Los Angeles.
Inyo Mono Advocates for Community Action	Community organization; Disadvantaged community representation	RWMG; Past: Budget work group	Medium	X		Inyo-Mono Advocates offer a variety of supportive services to fight poverty.
Inyo and Mono Counties' Agricultural Commissioner's Office	Agriculture Group	RWMG	Medium			The Inyo and Mono Counties' Agricultural Commissioner's Office is entrusted with the mission of protecting the agriculture industry of the Counties and its environment, ensuring the health and safety of the Counties' citizens, and fostering confidence and equity in the market place through education and the fair and uniform enforcement of laws, regulations, and ordinances enacted by the people of the State of California and the Counties of Inyo and Mono.
Inyo Mono Resource Conservation District	Community Organization	RWMG	Low			The Inyo Mono RCD provides technical assistance to landowners, services related to the improvement of land capabilities, resource conservation, prevention and control of soil erosion, and public education
Inyo National Forest	Land use authority; federal agency	RWMG	Medium	X		The Inyo National Forest is located in California's eastern Sierra Watersheds of interest include the Mono and Owens Lakes watersheds, as well as Fish Lake Valley and Eureka/Saline Valleys.

Agency/Organization Name	Stakeholder Category	Role in Inyo-Mono IRWMP	Level of participation	Pre-planning MOU signatory	Planning/ Implementation MOU signatory	Agency/organization mission/objectives
June Lake Advocates	Community organization	RWMG	Medium	X		A group of citizens committed to ensuring that the community of the June Lake Loop develops into a moderately-sized, year-round community that preserves the existing natural environment, mountain lifestyle, and ambience of the area.
June Lake PUD	Local water purveyor	RWMG	High	X	X	Provides water and sewer service to the community of June Lake. The district boundaries include 1,720 acres of land within the June Lake Loop, starting north of the June Lake Village Proper and continuing around the Loop to just below Silver Lake.
Keeler CSD	Local water purveyor	RWMG	Low			Serves Keeler, CA
Kern County	County agency	RWMG	Low			Kern County is located in the southern Central Valley of California. It extends east beyond the southern slope of the Eastern Sierra Nevada range into the Mojave Desert and west across the floor of the San Joaquin Valley to the eastern edge of the Temblor Range.
Kern County Water Agency	Local water agency	RWMG	Low			The KCWA serves as the local contracting entity for the State Water Project and participates in a wide scope of related activities to preserve and enhance Kern County's water supply, including the provision of a supplemental water supply for portions of the Metropolitan Bakersfield area.
Lone Pine-Paiute Shoshone Tribe	Native American Tribe; Disadvantaged community	RWMG	High	X	X	The Lone Pine Paiute-Shoshone Reservation is located at an elevation of 3,697 feet above sea level in the southern portion of the Owens Valley between the Sierra Nevada Mountains and Inyo Mountain Ranges, approximately 200 miles north of Los Angeles and 60 miles south of Bishop. The Lone Pine Paiute-Shoshone Reservation has a Tribal population of approximately 350 residents and consists of 237.4 acres of land near the community of Lone Pine, California.

Agency/Organization Name	Stakeholder Category	Role in Inyo-Mono IRWMP	Level of participation	Pre-planning MOU signatory	Planning/ Implementation MOU signatory	Agency/organization mission/objectives
Los Angeles Department of Water and Power	Water purveyor	RWMG	High			The LADWP, the largest municipal utility in the nation, was established more than 100 years ago to deliver reliable, safe water and electricity supplies to some 3.8 million residents and businesses in Los Angeles. The City owns approximately 314,000 acres in Inyo and Mono counties and associated water rights.
Lower Rock Creek Mutual Water Co.	Local water purveyor	RWMG	Low			Serves Lower Rock Creek area near Bishop, CA
Lundy Mutual Water Company	Local water agency	RWMG	Low	X		Serves Mono City, CA
Mammoth Community Water District	Local water agency	RWMG; Administrative Committee	High	X	X	Provides water and sewer service to the community of Mammoth Lakes. The district boundaries include 3,640 acres of land within the developed portion of the Town of Mammoth Lakes.
Mammoth Lakes Trails and Public Access	Community organization	RWMG	Medium	X		MLTPA advocates for, initiates, facilitates, and participates in the planning, implementation, and stewarding of a system of four-season trails and public access in Mammoth Lakes and the immediate Eastern Sierra.
Mammoth Lakes, Town of	City government	RWMG	Medium	X	X	The Town of Mammoth Lakes is General Law City within Mono County (the only incorporated municipality w/in the County) located on the eastern flank of the Sierra Nevada range in California. There are approximately 7,500 year-round residents.
Mammoth Mountain Ski Area	Local business	RWMG	Medium	X		A destination resort located in Central California on the eastern slope of the Sierra Nevada.
Mariposa County Resource Conservation District	Community organization	RWMG	Low			No information available.

Agency/Organization Name	Stakeholder Category	Role in Inyo-Mono IRWMP	Level of participation	Pre-planning MOU signatory	Planning/ Implementation MOU signatory	Agency/organization mission/objectives
Mariposa Public Utility District	Local water agency	RWMG	Low			The Mariposa Public Utility District (MPUD) was established in 1947. The District provides water, wastewater and fire protection services to the town of Mariposa. The District currently has 722 service connections and is approximately 873 acres in size.
Members of the public	Concerned citizens	RWMG	Various			Individual citizens, many with water rights, have expressed interested in the IRWMP and maintain various levels of involvement in the RWMG.
Mojave Desert Mountain Resource Conservation and Development Council	Environmental Stewardship Organization; Community organization	RWMG	High	X	X	An organization that supports economic development and environmental protection in Inyo, Kern, Los Angeles, Mono, San Bernardino, and Tulare counties.
Mono County	County agency	RWMG; Administrative Committee	High	X	X	Mono County is located in the east central portion of the U.S. state of California, to the east of the Sierra Nevada between Yosemite National Park and Nevada. The county seat is Bridgeport.
Mono County Resource Conservation District	Community organization	RWMG	Low		X	The Mono County Resource Conservation District covers an area that includes northern Mono County. The Walker River runs through it. The Lahontan Water Quality Control Board is the agency with jurisdiction over the watershed that drains into the Bridgeport Reservoir. Cattle, sheep, fishing and dude ranch operations are just some of the activities this district is involved in.
Mono Lake Committee	Environmental stewardship organization	RWMG; Administrative Committee	High	X	X	A non-profit citizen's group dedicated to protecting and restoring the Mono Basin Ecosystem; educating the public about environmental impacts to Mono Lake; and promoting cooperative solutions that protect Mono Lake.
Mountain Meadows Mutual Water Company	Local water purveyor	RWMG	Medium		X	Serves part of Crowley Lake, CA

Agency/Organization Name	Stakeholder Category	Role in Inyo-Mono IRWMP	Level of participation	Pre-planning MOU signatory	Planning/ Implementation MOU signatory	Agency/organization mission/objectives
National Park Service	Land use authority; federal agency	RWMG	Medium	X		The NPS manages Death Valley National Park, Devils Postpile National Monument, and Manzanar National Historic Site within the IRWMP planning region. Death Valley National Park is located in southern Inyo County and northern San Bernardino County, California; Devils Postpile National Monument is near Mammoth Mountain in extreme northeastern Madera County in eastern California; and Manzanar National Historic Site lies just north of Lone Pine along Highway 395.
Natural Resources Conservation Service	Federal agency	RWMG	Medium			The NRCS provides technical assistance to private land owners to conserve soil, water, and other natural resources through cooperative partnerships with local and state agencies.
Owens Valley Committee	Environmental stewardship organization	RWMG	High	X	X	A non-profit citizen action group dedicated to protecting the natural resources of the Owens Valley by monitoring water and land management, educating the public, and encouraging participation in local government.
Owens Valley Indian Water Commission	Community and environmental justice organization; Represents disadvantaged communities	RWMG	High	X	X	The Owens Valley Indian Water Commission was originally established in 1992 as the planning and coordinating body for Indian water rights issues related to the 1939 Land Exchange (U.S. Dept. of Interior & City of Los Angeles) on behalf of the Bishop Paiute Tribe, Big Pine Paiute Tribe of the Owens Valley, and Lone Pine Paiute-Shoshone Reservation; and, to provide services for environmental- and water-related issues for the Bishop Paiute Tribe, Big Pine Paiute Tribe of the Owens Valley, Lone Pine Paiute-Shoshone Reservation, Fort Independence Reservation and the Utu Utu Gwaitu Paiute Tribe.

Agency/Organization Name	Stakeholder Category	Role in Inyo-Mono IRWMP	Level of participation	Pre-planning MOU signatory	Planning/ Implementation MOU signatory	Agency/organization mission/objectives
Sierra Business Council	Community organization	RWMG	Low			Sierra Business Council is a member-based organization of over 700 individuals and businesses who are committed to pioneering innovative solutions in the Sierra Nevada.
Sierra Club	Environmental stewardship organization	RWMG	High	X	X	The Toiyabe Chapter of the Sierra Club is an environmental organization that serves the Eastern Sierra and Death Valley areas of California.
Sierra Nevada Alliance	Environmental stewardship organization	RWMG	Medium			A regional network of over 80 grassroots and organizations working throughout the Sierra. The Sierra Nevada Alliance provided project facilitation and outreach for the first 6 months of project launch for the I-M IRWMP.
Southern California Edison	Electrical corporation	RWMG	Low			Today's Southern California Edison is the product of more than a century of providing reliable electric service to central, coastal and southern California.
Timbisha Shoshone Tribe - Death Valley	Native American Tribe	RWMG	Low			The Timbisha Shoshone Tribe is headquartered in Death Valley National Park but has members throughout Nevada and eastern California.
Tri-Valley Groundwater District	Local groundwater agency	RWMG	Low			Serves Benton, Chalfant, and Hammil Valleys in eastern California
U.S. Bureau of Reclamation	Federal agency	RWMG	Low			Today, we are the largest wholesaler of water in the country. We bring water to more than 31 million people, and provide one out of five Western farmers (140,000) with irrigation water for 10 million acres of farmland that produce 60% of the nation's vegetables and 25% of its fruits and nuts.
U.S. Fish and Wildlife Service	Federal agency	RWMG	Low			Our mission is working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of American people.

Agency/Organization Name	Stakeholder Category	Role in Inyo-Mono IRWMP	Level of participation	Pre-planning MOU signatory	Planning/ Implementation MOU signatory	Agency/organization mission/objectives
U.S. Marine Corps Mountain Warfare Training Center	Military	RWMG	Medium			The Marine Corps' Mountain Warfare Training Center, as a major subordinate element of Marine Air Ground Task Force Training Command, and with support from Marine Corps Installations - West, conducts unit and individual training courses to prepare USMC, Joint, and Allied Forces for operations in mountainous, high altitude, and cold weather environments in support of the Regional Combatant Commanders.
Valentine Eastern Sierra UC Natural Reserve	University	RWMG	Low	X		The Sierra Nevada Aquatic Research Laboratory (SNARL), administered by the UC Santa Barbara, serves as a major center for research for the eastern Sierra Nevada and Owens Valley.
Virginia Lakes Mutual Water Company	Local water purveyor	RWMG	Low			Serves Virginia Lakes, CA
Walker Irrigation District	Local water agency	RWMG	Low			Serves Walker, CA
Walker River Paiute Tribe	Native American Tribe	RWMG	Low			The mission of the Walker River Paiute Tribe is to maintain our Agai Dicutta heritage while carrying it into the future. The Tribe is dedicated and committed to advocating and protecting Tribal sovereignty. The Walker River Tribe shall foster the ideal of community self-determination and self-sufficiency. We will strive to promote, preserve, and protect the quality of life for our Tribal members.
Wheeler Crest Community Services District	Local water purveyor	RWMG	High		X	Serves Swall Meadows, CA
White Mountain Mutual Water Company	Local water purveyor	RWMG	Low			Serves very eastern California near border with Nevada.

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Appendix B: Inyo Mono RWMG Pre-Planning Memorandum of Understanding

Inyo-Mono Integrated Regional Water Management Plan
Regional Water Management Group
Pre-Planning Phase Management

Memorandum of Understanding
November 21, 2008

This Memorandum of Understanding (MOU) is entered into as of [insert date of gaining signatures], of 2008, by the persons, entities, and organizations listed on the signatory page(s) hereto, for the purpose of establishing rules to govern the pre-planning phase of developing an Inyo-Mono Integrated Regional Water Management Plan (IRWMP).

The purpose of the IRWMP is to meet the integrated water needs of the people and watersheds of the Inyo and Mono County region now and into the future. The IRWMP will be developed in three phases: 1) a pre-planning phase during which an application to the California Department of Water Resources (DWR) for a Planning Grant will be developed and submitted; 2) a planning phase during which an Inyo-Mono IRWMP will be developed and; 3) an implementation phase during which the plan will be implemented. The Inyo-Mono IRWMP Regional Water Management Group (hereinafter referred to as the "Inyo-Mono Planning Committee" or "Planning Committee") will be realized through this MOU for the purpose of pre-planning the IRWMP.

Purpose

The purpose of this MOU is to provide governance for entities participating in the effort to conduct pre-planning for the development of an IRWMP. Governance of the planning phase and implementation phase of the IRWMP will be developed as each phase is initiated. This MOU is a statement of mutual understanding among the Planning Committee members to acknowledge the intentions of the parties and provide for cooperative action regarding:

- The roles and responsibilities of the parties in pre-planning for the IRWMP.
- The structure that will be used to exchange information with the Inyo-Mono IRWMP Planning Committee, Coordinating Committee, and other interested parties, and the public to provide for technical review and public support for the IRWMP.

Duration of this Memorandum of Understanding

This MOU shall be in effect until such time as another revised MOU or some other agreement is entered into by the members of the Planning Committee during the IRWM planning process. Interested members of the public may provide input or share concerns in the process of revising the MOU or forming another agreement. The foregoing notwithstanding, the term of this MOU may be extended beyond the planning process by consensus decision of the Planning Committee.

Scope of this Memorandum of Understanding

Neither this MOU, nor any IRWMP developed there from, are intended to, and do not, impose legally binding requirements on the entities that adopt or participate in the MOU or IRWMP. The IRWMP's purpose will be to summarize the process and the plan developed by the stakeholders of the Inyo-Mono Region to achieve sustainable water uses, reliable water supplies, better water quality, environmental stewardship, efficient urban development, protection of agriculture, and a strong economy.

Although the IRWMP will refer to many legally binding statutory and regulatory provisions, — such as general plans, zoning ordinances, water quality plans, and various permits, licenses, and approvals— its purpose in doing so is to ensure that the IRWMP is consistent and compatible with those existing legal obligations. Rather than adding to or modifying the present legal and regulatory environment, the IRWMP is intended to streamline and improve the stakeholders' ability to operate and succeed within that environment.

Thus, the IRWMP provides guidance to, but does not impose any mandates upon, the water agencies, land use agencies, local governments, watershed organizations, individuals, and others who adopt the IRWMP.

Background

IRWMP Launch of Pre-Planning Phase

The Inyo-Mono Planning Committee intends to carry out an IRWMP pre-planning process, which will culminate in submitting a Planning Grant Proposal to DWR under the Proposition 84 guidelines. The proposal is anticipated to be submitted in 2009.

IRWMP Adoption

Any organizations, agencies, or individuals that support the Inyo-Mono IRWMP may adopt it. These include organizations representing water agencies, conservation groups, agriculture representatives, land use entities, tribal nations, and local, state, and federal agencies as well as private individuals with an interest in the Inyo-Mono region.

IRWMP Geographic Boundaries

The IRWMP is a planning document that addresses critical needs in the watersheds in Inyo and Mono Counties including: East and West Walker, Mono Basin, Owens River watershed, Amargosa watershed, Fish Lake Valley (CA portion) and Death Valley watershed.

Planning Horizon

The Inyo-Mono IRWMP planning horizon is approximately twenty years into the future, —in the range of 2028-2030. However, this MOU is limited to the pre-planning phase, which will end with submittal of the grant proposal to DWR in 2009.

Pre-Planning Phase Management Structure

Planning Committee

The Planning Committee forms the Regional Water Management Group of the Inyo-Mono IRWMP. The Planning Committee will oversee and approve all major decisions concerning the pre-planning phase during which an application to DWR for a Planning Grant will be developed and submitted. The Planning Committee will set the overall strategic direction for planning the proposed IRWMP. During the pre-planning phase, the Planning Committee, or its designated Work Groups, will meet every month. After the pre-planning phase, the Planning Committee will meet quarterly or as necessary.

During the pre-planning phase, The Planning Committee will be staffed by a Project Manager who will oversee all aspects of the work necessary to complete the grant proposal for submission to DWR. A Project Assistant will also assist the effort. Facilitation of the Planning Committee and its workgroups will be provided by the Center for Collaborative Policy, California State University, Sacramento.

Membership

The Planning Committee strives to ensure its membership represents a broad range of interests, including: water supply, water quality, environment/habitat, recreation, agriculture and ranching, resource management, hydropower, cities/counties, sanitation, other water resource management areas, economically disadvantaged local communities and individual local stakeholders interested and willing to participate. In order to cover these interests, members may include, but are not limited to: water agencies, resource agencies, conservation groups, tribes, agricultural and ranching interests, cities, counties, education organizations, representatives of disadvantaged communities, private landowners, and businesses.

As required by DWR, the Planning Committee will have at least three public institutions, two of which have authority over water.

Planning Committee membership will be comprised of those who sign this MOU before submission of the Planning Grant proposal. Planning Committee members must be committed to ensuring long-term ecosystem health of the areas watersheds, water supply, water quality, involvement of the local communities, especially disadvantaged communities; and the protection, and restoration of natural resources of the Inyo-Mono region; and agree to work constructively with others.

The Project Manager will check in with Planning Committee members on regular basis to reconfirm their intent to actively participate and their primary representative. This will not be binding or require the member to re-sign the MOU. This activity is merely intended to give the Project Manager and Planning Committee the most updated list of active Planning Committee members, including primary and alternate representatives. Membership in the Planning Committee may change to accommodate evolving circumstances, such as changes in individual organizational capacity or participation.

Planning Committee members agree they will strive to support the Inyo-Mono IRWMP through a variety of supporting activities, which may include in-kind contributions and/or funding.

Nothing in this document is to be interpreted to mean that any federal funds will be obligated in violation of the Anti-Deficiency Act.

Planning Committee Meetings

The Planning Committee will meet monthly and schedule additional meetings if necessary to ensure effective planning and implementation. All Planning Committee meetings are open to the public. Interested parties are welcome and encouraged to attend to share concerns about projects, provide input on plan implementation, and learn about the Inyo-Mono IRWMP. Notes from these meetings shall be distributed to all interested parties and will be posted on the web for public viewing.

Inyo-Mono Planning Committee meetings are noticed via an inclusive e-mail list that will grow as the process progresses. In addition, the Planning Committee will begin sending meeting announcements to all the public agencies involved in the process and encourage them to post meeting information on their web pages and to announce through agency noticing procedures. Planning Committee members are not responsible for compliance with public agency noticing requirements (e.g., Brown Act).

Representation

Each member organization will identify its lead representative for the Planning Committee and will make its best effort to attend Planning Committee meetings. Planning Committee members may choose to identify alternates but they are encouraged to have the same representative attend all Planning Committee meetings for consistency.

Leaving the Planning Committee

This MOU is non-binding and non-regulatory. The Planning Committee members ask that if a member group or individual wants to leave, it notifies the rest of the Planning Committee, at which point they will no longer be a member of the Planning Committee.

Coordinating Committee

The Coordinating Committee, appointed by the Planning Committee, is a smaller, representative group of the Planning Committee that meets as needed between Planning Committee meetings to assist staff and the Planning Committee with process planning, recommendations for process modifications, communications, and other issues for which staff needs advice. The Coordinating Committee may also provide more consistent fiscal oversight in helping to manage the pre-planning process. Ultimate decision-making still resides with the Planning Committee. Membership in the Coordinating Committee may change to accommodate evolving circumstances (such as changes in individual organizational capacity or participation history) by consensus of the Planning Committee. The Coordinating Committee meets every month during planning stages and then every other month or as needed thereafter. This schedule could change again during implementation planning.

The Coordinating Committee may play a role in developing substantive proposals and policy, at the request and subject to the approval of the Planning Committee, but has no decision-making authority.

Ad-Hoc Work Groups

Ad-Hoc Work Groups may be formed as needed by the Planning Committee to undertake work on specific topics or issues and shall give input and recommendations to the Coordinating Committee and Planning Committee. All advice provided by work groups will be reviewed by the Planning Committee as a whole.

Fiscal Agent

California Trout shall serve as Fiscal Agent for the Inyo-Mono IRWMP pre-planning phase. Duties include administering grant funds; coordinating meetings for the Coordinating Committee, Planning Committee, and any work groups that may be formed; producing and distributing meeting notes and notices; contracting new staff; and maintaining a webpage where IRWMP documents can be accessed.

Annual Financial Reporting

At the close of each calendar (or fiscal) year, the fiscal agent and individual project partners shall provide a complete accounting of fiscal activity related to the Inyo-Mono IRWMP and associated projects to the Planning Committee.

Any budget line item change over $1,000 should be reviewed and approved by the Coordinating Committee, as the fiscal overseer of the IRWMP. Any budget line item change over $10,000 must be reviewed and approved by the Planning Committee.

Planning Committee Decision Making

Decision Making Rule: Consensus as the Fundamental Principle

The Coordinating Committee and Planning Committee shall base its decision-making on consensus (agreement among all participants) in all of its decision-making. Working toward consensus is a fundamental principle of the Inyo-Mono IRWMP process.

Definition of "Consensus"

In reaching consensus, some members may strongly endorse a particular proposal while others may accept it as "workable." Others may be only able to "live with it". Still others may choose to "stand aside" by verbally noting a disagreement, yet allowing the group to reach a consensus without them if the decision does not affect them or compromise their interests. Any of these actions still constitutes consensus. Every effort will be made to address the concerns of even a lone voice of opposition. Planning Committee members will be provided an initial orientation to the strengths, weaknesses and best practices in group consensus decision making; the Committee will also conduct an annual review and update on consensus decision making.

Since neither the Coordinating Committee nor the Planning Committee has any regulatory authority, any decisions it makes cannot regulate or force another entity against its will to take an action not in its interest. All decisions will be made and developed under the consensus rule. Recognizing that since consensus may not always be achievable, the Planning Committee will archive all 'avoided decisions" and annually review these in order to record the subject and to continue seeking solutions for difficult and important issues for which consensus was not initially found.

Definition of Active Participation by Planning Committee Members

Active participation means regular attendance at Planning Committee meetings; regular participation in at least one Work Group or ensuring that a designee of the Planning Committee member's organization participate in a Work Group under the Planning Committee member's close guidance; and reviewing planning and other written documents before discussions or decisions will be made. It is understood that occasionally Planning Committee members may need to miss a Planning Committee and/or Work Group meeting. If there is a question as to whether a Planning Committee member should be considered "active" for purposes of decision-making, the Coordinating Committee will advise the Planning Committee.

Revisions to the MOU

Any revisions to this MOU must be made through the decision-making process outlined in Section 4.1 above.

Signature Page Date: ____________________________

______________________________ ______________________________

Name (Signature) Print Name

____

Organization

Primary Representative:

Email: ____

Telephone: ____

Address: ____

Alternative Representative:

Email: ____

Telephone: ____

Address: ____

Appendix C: Inyo-Mono Planning/Implementation MOU

INYO-MONO REGIONAL WATER MANAGEMENT GROUP
PLANNING AND IMPLEMENTATION MEMORANDUM OF UNDERSTANDING

Effective November 15, 2010

WHEREAS, on November 21, 2008, a Memorandum of Understanding was entered into for the Pre-Planning Phase of the Inyo-Mono Integrated Regional Water Management Plan; and

WHEREAS, this Memorandum of Understanding reflects the further development of the Plan by establishing the basis for governance and consensus; and

WHEREAS, the parties to this Memorandum of Understanding seek to provide stability and consistency in the planning, management, and coordination of water resources within the watershed of the Inyo-Mono Region pursuant to the Integrated Regional Water Management Planning Act (California Water Code section 10530 et seq.); and

WHEREAS, the parties to this Memorandum of Understanding will identify projects, establish the priority of such projects and seek funding to implement such water-related projects in the Inyo-Mono Region as part of the development of an Inyo-Mono Regional Water Management Plan; and

WHEREAS, the parties to this Memorandum of Understanding are not limited in seeking other funding for water-related projects, nor does this Memorandum of Understanding impose legally binding requirements on the parties;

NOW, THEREFORE, the parties agree as set forth below to work together in the Inyo-Mono Regional Water Management Group for the Inyo-Mono Region to carry out the purposes of this Memorandum of Understanding and develop and advance the Inyo-Mono Regional Water Management Plan.

ARTICLE I

DEFINITIONS

Section 1.01 Definitions. Unless the context requires otherwise, the words and terms defined in this Article shall have the meanings specified.

"IRWM Planning Act" or "Planning Act" means the Integrated Regional Water Management Planning Act, Part 2.2 of Division 6 of the California Water Code commencing with section 10530.

"IRWM Plan" or "Plan" has the meaning set forth in Water Code section 10534, which is a comprehensive plan for a defined geographic area, the specific development, content and adoption of which shall satisfy requirements of the Planning Act.

“Regional Water Management Group” has the meaning set forth in California Water Code section 10539, which is a group of three or more local agencies, at least two of which have statutory authority over water supply or water management, as well as those other persons who may be necessary for the development and implementation of a Plan.

“Inyo-Mono Region” or “Region” generally includes Inyo and Mono Counties, northern portions of San Bernardino County and the northeastern portion of Kern County as depicted in the Map attached as Exhibit “A”.

“Inyo-Mono Regional Water Management Group” or “Group” means the Regional Water Management Group for the Inyo-Mono Region.

“Member of the Inyo-Mono Regional Water Management Group” or “Member” means an entity identified in California Water Code §10541 (g) that is based in the Region, has members or chapters in the Region, or has water management authority in the Region, and is a signatory to this Memorandum of Understanding. Member Representative refers to the person or persons representing the Member at meetings of the Group.

“Admin Committee” means the Administrative Working Committee as defined in Section 2.05.

“Consensus” means approval of the Member Representatives to move forward with a particular action. “Consensus” does not mean that all Member Representatives support an action, but rather that no Member Representative has voted to oppose an action. A Member Representative may abstain or not vote and that will be considered as no opposition to the action. A Member Representative may verbally note disagreement with an action but still allow consensus without the Member Representative’s support. To vote, a Member Representative must be present in person or by telephone or other electronic device that enables the Member Representative to participate in the discussion. It is understood by the Group that some actions will require a decision by the governing body of one or more Members.

“Chair and Vice-Chair” means the Chairperson and Vice-Chairperson of the Administrative Working Committee.

“Cooperating Entity” means a business, organization, individual or agency that is not a Member of the Inyo-Mono Regional Water Management Group but is selected to carry out a specific project.

“Disadvantaged Community” or “DAC” means any community within the Region qualifying as a Disadvantaged Community under California law using then-current U.S. Census data.

“Fiscal Year” means the period from July 1st to and including the following June 30th.

“MOU” means this Memorandum of Understanding, as existing or as subsequently amended.

“Secretary” means the Secretary of the Inyo-Mono Regional Water Management Group appointed by the Administrative Working Committee.

ARTICLE II

PURPOSE AND ORGANIZATION

Section 2.01 Purpose. This MOU is entered into in accordance with the Planning Act for the purpose of forming the Group that will (1) develop, implement and periodically update the Plan, and (2) coordinate planning and actions with connected Regions. The Group shall work to:

(a) Support regional objectives and the objectives of the California Water Plan.
(b) Promote communication and cooperation within the Region in support of these objectives.
(c) Facilitate investment in projects that can minimize costs and maximize regional benefits through cooperation between Members and Cooperating Entities, through economies of scale, through projects with multiple resource benefits, or through DAC projects.
(d) Endeavor to assure an element of geographic fairness in the ranking of projects.

This MOU does not impose legally binding requirements on its Members and is not an enforceable contract or agreement. It is a statement of principles for how the Group will conduct business.

Section 2.02 Term of MOU. This MOU shall replace the MOU dated November 21, 2008. This MOU shall continue in effect until terminated by all then-current Members. Inclusion of additional Members, and/or withdrawal of Members shall not terminate this MOU.

Section 2.03 Member Representatives. Each member shall designate a Member Representative to the Group. More than one Member Representative may be appointed, but each Member shall have only one vote. A Member may appoint someone as their Member Representative notwithstanding the fact that such person is also the Member Representative for another Member. In such instances, such person shall have one vote on behalf of each Member represented.

Section 2.04 Decision Making. Decision making by the Group is based upon consensus of those Member Representatives present in person, by phone, or electronically. Where action by the governing body of one or more Members whose representative is present is required, or desirable, the matter shall not be considered approved by the Group until a decision by those governing bodies has been obtained. A Member's governing body may, in its discretion, elect to note disagreement with but "not oppose" an action, rather than disapprove it, thereby allowing the action to move forward without its endorsement.

If the Group cannot reach consensus, the matter may be referred to the Admin Committee for further work and consideration. The Group or the Admin Committee may appoint an ad hoc committee for this task. The Admin Committee or the ad hoc committee shall then report back to the Group. If consensus by the Group cannot be reached at this point, the matter is taken off the agenda. At a later point, the matter may be placed on the agenda for further consideration.

Section 2.05 Administrative Working Committee. The Admin Committee, along with such staff as the Group may employ, shall be responsible for the on-going administrative work of the Group. The Admin Committee shall consist of six (6) Members who shall serve a term of two years. Three Members of the first Admin Committee shall serve a term of one year, so that there will be an orderly transition of administrative business. Members of the Admin Committee shall serve on a rotating basis so that every Member has the opportunity to serve, notwithstanding that a Member may decline to serve. Members may serve consecutive terms with approval of the Group.

The Chair or Vice-Chair of the Admin Committee shall act as Chair of the Group meetings.

Section 2.06 Other Working Committees. Other working committees shall be appointed by the Group or by the Admin Committee as needed.

Section 2.07 Quorum. The presence of fifty percent of the Members of the Group or the working committees shall constitute a quorum for the transaction of business, except that less than a quorum may adjourn a meeting from time to time.

Section 2.08 Meetings. Members shall meet at least quarterly in a regularly scheduled meeting. Location of meetings shall rotate throughout the planning region Meetings shall be chaired by the Chair or Vice-Chair of the Admin Committee.

- The Admin Committee shall meet at least monthly at a location of its own choosing.
- Other working committees shall meet as needed at a location of their own choosing and shall select their own chair.
- Attendance at all meetings may be in person or by electronic connection.
- All meetings are open to the public and shall be publicly noticed.

Section 2.09 Minutes. The Admin Committee shall appoint a Secretary to be responsible for preparing an agenda, maintaining a record of the activities of the Group and the Admin Committee, and performing such other duties as necessary. The Secretary is responsible for noticing all Group meetings, Admin Committee meetings and working committee meetings. Minutes of all meetings, including those from the Admin Committee meetings, and any special reports or documents, shall be distributed to the Group.

Section 2.10 Organization, Bylaws and Policies and Procedures. The Group may incorporate as a nonprofit public benefit corporation. The Group may establish Bylaws and Policies and Procedures as necessary.

Section 2.11 Fiscal Agent. The Admin Committee, with approval by the Group, is responsible for establishing a Fiscal Agent with appropriate qualifications to receive, disburse and account for funds related to this MOU. Until such time as this Fiscal Agent is established, California Trout shall remain the Fiscal Agent for the Group. Funding received by the Fiscal Agent to carry out projects shall be disbursed to Members or to Cooperating Entities only after the Fiscal Agent enters a funding agreement with the Member or Cooperating Entity as may be appropriate or required. The Fiscal Agent shall be responsible for any necessary financial reporting, including reports needed to comply with the terms of any grant agreement. The Fiscal Agent shall report annually to the Group and monthly to the Admin Committee. All fiscal reports shall be distributed to the Group.

Section 2.12 Staff. The Group may employ professional staff or consultants as needed and within prudent fiscal constraints. The Group may accept staffing funded by members of the Group or others.

Section 2.13 Annual Budget. The Admin Committee shall develop an annual budget for each fiscal year for administrative expenses. The budget shall be approved by the Group. The budget shall be based upon funds available or pledged as of May 31st of the previous year. The budget may be modified during the fiscal year as necessary with approval by the Group. Each annual budget shall be approved by the group.

Section 2.14 Annual Operational and Fiscal Report. The Admin Committee is responsible for preparing an annual operation and fiscal report for presentation to the Group at the end of each fiscal year. The annual report of the Fiscal Agent is part of this report.

Signature Page

Date: ______________________

____
Organization

____
Name and position (print)

____
Name (signature)

Primary Representative:

Email: ____

Telephone: ____

Address: ____

Alternative Representative:

Email: ____

Telephone: ____

Address: ____

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Appendix D: Inyo-Mono IRWMP 2010 Request for Proposal

Inyo-Mono Integrated Regional Water Management Plan

2010 Request for Proposals

IRWM Program Implementation

Round 1 Grants

November 19, 2010

Thank you for your interest in the Inyo-Mono IRWM Program. This document provides you with detailed instructions for how to provide the information necessary for your project to be reviewed for potential inclusion in the Inyo-Mono IRWM Plan and/or Round 1 Implementation funding grant, as well as a project review process timeline.

Steps for completing project review process:

1. Complete Worksheet A and submit to Holly Alpert (holly.alpert@gmail.com) **by 5:00 pm, Friday, November 5, 2010**. If you have questions regarding Worksheet A or the content therein, contact Holly Alpert at the email address above or Mark Drew (mdrew@caltrout.org).

2. Staff will review completed applications and will inform project applicants whether project has been deemed eligible for the first round of Implementation funding. **Project proponents will be contacted by November 9, 2010.**

3. The list of eligible/non-eligible projects will be reviewed by the governing bodies of the Planning Committee Members, and final determination of eligible projects will be made at the November 17, 2010, Planning Committee meeting.

4. By November 18, 2010, eligible project proponents will be contacted and asked to complete Worksheet B.

5. Project proponents will submit Worksheet B to Holly Alpert **by 12:00 (NOON) pm, Monday, November 29, 2010.** IRWMP staff will provide completed project applications to Planning Committee Members for review and ranking.

6. Planning Committee Members will submit their project rankings to Holly Alpert by **5:00 pm Monday, December 6**. IRWMP staff will tally ranking results and develop an overall ranking list for discussion and approval at the December 6 afternoon Planning Committee meeting. At this time, the top-ranked project proponents will be asked to prepare full project proposals for inclusion in the Implementation grant proposal.

7. Full project proposals are due to Holly Alpert by **9:00 am, Monday, January 3, 2011**.

8. The Implementation grant proposal will be submitted to the Department of Water Resources **on or before January 7, 2011**.

Note: Materials explaining eligibility review (for Worksheet A) and Planning Committee project review and ranking (Worksheet B) are included in Appendix C and D at the end of this document.

Inyo-Mono IRWMP Project Review Process Timeline

Date	Activity
Wednesday, October 27, 9 am – 12 pm: Planning Committee Meeting	• Discuss project review process • Discuss project RFP • Circulate RFP with formal request
Friday, November 5, 5:00 pm	Worksheet A of project applications due to IRWMP staff
Monday-Tuesday, November 8-9	Project Staff reviews applications and develops eligibility list, which is then sent to Planning Committee
Monday, November 15	Planning/implementation MOU takes effect
Wednesday, November 17: Planning Committee Meeting	• Approve project review process • Approve eligible project list • Request completion of second half of applications
Thursday, November 25	Thanksgiving
Monday, November 29, 12:00 pm	• Worksheet B of project applications due to Project Staff • Project Staff will send out completed applications and forms for evaluation and ranking
Monday, December 6	• Ranked Worksheet B of project applications due to staff at 5:00 pm; staff will add up scores and determine rankings
Wednesday, December 8	• Planning Committee meeting 9:00 – 12:00 to determine final ranking of projects • Project proposal workshop in afternoon for project proponents and other interested entities
Saturday, December 25	Christmas
Saturday, January 1	New Year's
Monday, January 3, 9:00 am	Final project proposals due to IRWMP staff for inclusion in Implementation Grant proposal
Friday, January 7, 2011	Submission of Implementation Grant proposal to DWR

Worksheet A
Inyo-Mono IRWMP Project Application
Round 1 Implementation

To be completed by all project proponents and submitted to Holly Alpert by 5:00 pm, Friday, November 5. This will be evaluated by Inyo-Mono IRWMP Project Staff to determine eligibility of project.

1. Project Description

Project proponent:

Is the project proponent a signatory of the planning/implementation MOU? If not, are there plans in place to become an MOU signatory on or before November 15, 2010?

Contact person:

Phone:

E-mail:

Name of project:

County(ies) where the project will be implemented:

Watershed(s) where the project will be completed:

Project description/narrative (500 words maximum, Times New Roman 12-point font). This should include: 1) Brief problem statement, 2) Objectives of the project, 3) Project design, 4) Deliverables and expected outcomes, 5) Beneficiaries of project, and 6) Partners on the project.

Budget. * Please refer to Guidelines for eligible costs for DWR reimbursement through the IRWM program (available from the www.inyomonowater.org). These expenses can be part of the match. Provide as much information about the budget as possible at this time, including expected amounts and sources of funding matches. Refer to Plan Guidelines and Implementation PSP for more information.

Estimated project duration:

2. State Water Plan Objectives. Please indicate which of the following objectives from the Water Plan Update 2009 this project addresses (check all that apply). Project proponent must meet at least one of these objectives in order to be eligible for Round 1 Implementation grants.

Reduce Water Demand: **❑Yes ❑No**

Improve operational efficiency and transfers: **❑Yes ❑No**

Increase water supply: ❑**Yes** ❑**No**

Improve water quality ❑**Yes** ❑**No**

Practice resource stewardship ❑**Yes** ❑**No**

Improve flood management ❑**Yes** ❑**No**

<u>3. Prop. 84 Requirements.</u> For each Yes answer, provide a one-sentence description justifying your answer.

❑**Yes** ❑**No** Does the project improve water supply reliability, water conservation and water use efficiency?

❑**Yes** ❑**No** Does the project involve storm water capture, storage, clean-up, treatment, and management?

❑**Yes** ❑**No** Does the project remove invasive non-native species, create or enhance wetlands, or protect and restore open space and watershed lands?

❑**Yes** ❑**No** Does the project involve non-point source pollution reduction, management and monitoring?

❑**Yes** ❑**No** Does the project involve groundwater recharge and management projects**?**

❑**Yes** ❑**No** Does the project involve contaminant and salt removal through reclamation, desalting, and other treatment technologies and conveyance of reclaimed water for distribution to users?

❑**Yes** ❑**No** Does the project involve water banking, exchange, reclamation and improvement of water quality?

❑**Yes** ❑**No** Does the project involve planning and implementation of multipurpose flood management programs?

❑**Yes** ❑**No** Does the project involve watershed protection and management?

❑**Yes** ❑**No** Does the project involve drinking water treatment and distribution?

❑**Yes** ❑**No** Does the project involve ecosystem and fisheries restoration and protection?

4. Project Status/Project Readiness

Technical and economic feasibility

1. Is this a project under CEQA?

   ❑Yes ❑No

   If yes, what level of CEQA is required?
   What will be the status of completing CEQA by June, 2011? What is the proposed schedule for completing CEQA?

2. Is this a project under NEPA?

   ❑Yes ❑No

   If yes, what level of NEPA is required?
   What will be the status of completing NEPA by June, 2011? What is the proposed schedule for completing NEPA?

3. What are the local and regional permitting requirements (if any), and have they been met? If not, what is the current status of compliance and/or plan for complying with the requirements? If permits are required, when do they expire?

4. Will there be staff available for project implementation, or will they need to be hired?

5. What kinds of planning documents, outside of permitting, are necessary for the project, and are they complete? For example, engineering designs or blueprints, work plan, etc.

6. What other financial resources (internal and/or external) will be available to undertake the project and sustain it beyond the IRWM grant?

7. Does the project proponent have the authority or approval to implement the project (such as landowner approval; approval from governing board; or fee, easement, or license rights)? What will be the status of achieving the appropriate approvals by June, 2011? If approvals have not been granted by June, 2011, what is the proposed schedule for achieving such approvals?

Worksheet B
Inyo-Mono IRWMP Project Application
Round 1 Implementation

To be completed by project proponents deemed eligible for Round 1 Implementation funding. Completed worksheets should be submitted to Holly Alpert by 9:00 am, Monday, November 29, 2010. This part of application will be evaluated and ranked by Planning Committee Members.

1. Inyo-Mono IRWM Plan Requirements

1. Does the project support one or more IRWM Plan objectives? See Appendix A for list of objectives.

   ❑Yes ❑No

   If yes, list applicable objectives (indicate number/letter combinations from Appendix A).

2. Does the project support one or more IRWM Plan Resource Management Strategies? See Appendix A for list of RMS.

   ❑Yes ❑No

   If yes, list applicable Resource Management Strategies (indicate number/letter combinations from Appendix A).

3. Will this project benefit disadvantaged communities? If yes, list DACs that will benefit. (If uncertain which communities quality as DACs, refer to RAP, Planning Grant application, or Project Staff.)

4. Will this project involve or benefit Native American Indian Tribes? If yes, list Tribes and locations.

2. Subjective Evaluation Narratives (limit responses to 100 words or fewer)

1. Will this project result in reduced greenhouse gas emissions? If yes, explain how.

2. Will this project contribute to developing or implementing adaptation strategies to respond to climate variability impacts on water resources? If yes, explain how.

3. Are there any expected negative economic or environmental impacts of the project? Please describe.

4. Does the project address public health and safety concerns? Please describe.

5. Will this project contribute to achieving compliance with regulatory requirements?

6. Will this project provide short-term and/or long-term economic benefits? If yes, quantify in terms of

how much and for what duration with respect to jobs and local spending.

7. Does the project mitigate existing negative environmental conditions? Please explain.

(RFP) Appendix A
Inyo-Mono IRWM Plan Objectives and Resource Management Strategies

Overview: In the IRWMP process, development of objectives is a key step, as objectives provide a basis for selecting and evaluating projects. As a result, the Inyo-Mono IRWM Planning Committee undertook extensive outreach within the planning region to identify pressing water-related issues and challenges. In response, the following objectives and resource management strategies were developed and adopted by the Planning Committee to address the identified issues. The planning objectives and strategies provide targeted outcomes that will benefit the region. When implementing regional projects, project partners will strive to meet as many objectives as possible while also recognizing that some objectives may not be fully achieved.

Objective	Resource Management Strategies
1. Protect, conserve, optimize, and/or augment water supply	A. Improve water supply reliability B. Improve system flexibility and/or efficiency C. Support compliance with current and future state and/or federal water supply standards D. Address local water supply issues through various techniques, including, but not limited to: groundwater recharge projects, conjunctive use of water supplies, water recycling, water conservation, water transfers, and precipitation enhancement E. Advance understanding of regional groundwater issues (including monitoring) and provide for solutions F. Optimize existing storage capacity G. Conserve and/or adapt water uses to future conditions H. Capture and manage runoff I. Incorporate and/or implement low-impact development design features, techniques, and/or practices to reduce water demand J. Support appropriate recreational activities

Objective	Resource Management Strategies
2. Protect, restore, and/or enhance water quality	A. Support compliance with current and future state and/or federal water quality standards B. Improve the quality of urban runoff, storm water, and/or wastewater C. Reduce erosion and sedimentation D. Protect public and/or aquatic ecosystem health E. Match water quality to water use F. Support appropriate recreational activities
3. Provide stewardship of our natural resources	A. Protect, restore, and/or enhance natural processes, habitats, and/or threatened and endangered species B. Protect, restore, and/or enhance ecosystems such as upland forests and meadows dependent on surface/shallow water supply C. Enhance recreational and/or educational opportunities D. Identify, develop, and implement efforts to better control invasive species E. Assess ecosystem health of watersheds in the region
4. Maintain and enhance water, wastewater, and/or power generation infrastructure efficiency and reliability	A. Systematically and strategically rehabilitate and replace aging water, wastewater delivery and/or wastewater treatment facilities in rural communities, including tribal lands B. Ensure fire protection capacity C. Improve energy efficiency of water systems and uses D. Promote use of water efficiency in power generating facilities
5. Address climate variability and/or reduce greenhouse gas emissions	A. Increase understanding of water related greenhouse gas emissions B. Manage and modify water systems to respond to increasing climate variability C. Use cleaner energy sources to move and treat water
6. Increase participation of small and disadvantaged communities in IRWM process	A. Engage regional communities in collaborative water and natural resource related efforts B. Provide assistance for tribal and DAC consultation, collaboration, and access to funding for water programs and projects

(RFP) Appendix B
Project review process for Round 1 Implementation Grants

- DWR has stated that a priority for funding projects in Round 1 Implementation is for disadvantaged communities and Tribes.

- This RFP provides information and materials to allow initial screening by Project Staff as well as Planning Committee evaluation and ranking
    - This reflects Inyo-Mono goals/objectives/resource management strategies
    - This reflects Prop. 84 requirements
    - It is strongly suggested to read DWR Prop. 84 Plan Guidelines and Implementation PSP (can download from project website: http://www.inyomonowater.org/index.php?page=Documents)
    - Entities that are not signatories to the MOU must either submit through a County (for public entities) or partner with another MOU signatory in order to be eligible to submit a project.

- Worksheet A
    - Will be evaluated by IRWMP staff for project readiness
    - Objective is to develop list of eligible projects for 1st round
    - Identify relative readiness of projects to be incorporated in the Phase I Plan

- Worksheet B
    - Information provided to Planning Committee for project ranking

- Appendix A: List of objectives and resource management strategies for Inyo-Mono IRWM region

- Appendices C&D: Evaluation forms to be used by IRWMP staff and Planning Committee for Worksheets A and B, respectively.
    - Project rankings in Appendix D should start at 1 for the highest-ranked project and then descend sequentially
    - This will result in an individual preference /ranking list that will then be averaged across evaluators to determine overall ranking of reach project.

- Rules for Planning Committee evaluation of project proposals:
    - Anybody is welcome to read project proposal and contribute to relevant discussions. However, only MOU signatories will be able to formally evaluate project proposals.
    - Entities wanting to review proposals must commit to reviewing ALL proposals
    - If project evaluator does not complete all evaluations, none of that evaluator's reviews will be considered.
    - Only planning/implementation MOU signatories can vote on final ranking of projects. Furthermore, only those that evaluate projects can vote on final ranking and have veto rights.
    - Should an evaluation result in a veto, discussion during the proposed early December meeting will result in a final project ranking decision or to place it in a "parking lot." The December 6 meeting is the last opportunity to veto a project.
    - There will be 2-3 project alternates after the final ranking process so that if a top-ranked entity cannot complete the full proposal, another entity can take its place.

(RFP) Appendix C
Inyo-Mono IRWMP
Project Eligibility Worksheet for Staff

I-M IRWMP Project Staff will undertake an initial analysis to determine whether a project proposal meets the requirements necessary to be put forth as “ready” for ranking by the Planning Committee as part of the Inyo-Mono IRWM Plan.

Note: The Planning Committee reserves the right to overrule staff recommendations.

Criterion #1: State Water Plan objectives. Project proponent must meet at least one of the State Water Plan objectives.

Reduce Water Demand ❑**Yes** ❑**No**

Improve operational efficiency and transfers ❑**Yes** ❑**No**

Increase water supply ❑**Yes** ❑**No**

Improve water quality ❑**Yes** ❑**No**

Practice resource stewardship ❑**Yes** ❑**No**

Improve flood management ❑**Yes** ❑**No**

Criterion #2: Prop. 84 Requirements. For each Yes answer, provide a one-sentence description justifying your answer. Project proponents must address at least one Prop. 84 criterion.

❑**Yes** ❑**No** Does the project improve water supply reliability, water conservation and water use efficiency?

❑**Yes** ❑**No** Does the project involve storm water capture, storage, clean-up, treatment, and management?

❑**Yes** ❑**No** Does the project remove invasive non-native species, create or enhance wetlands, or protect and restore open space and watershed lands?

❑**Yes** ❑**No** Does the project involve non-point source pollution reduction, management and monitoring?

❑**Yes** ❑**No** Does the project involve groundwater recharge and management projects**?**

❑**Yes** ❑**No** Does the project involve contaminant and salt removal through reclamation, desalting, and other treatment technologies and conveyance of reclaimed water for distribution to users?

❑**Yes** ❑**No** Does the project involve water banking, exchange, reclamation and improvement of water quality?

❑**Yes** ❑**No** Does the project involve planning and implementation of multipurpose flood management programs?

❑**Yes** ❑**No** Does the project involve watershed protection and management?

❑**Yes** ❑**No** Does the project involve drinking water treatment and distribution?

❑**Yes** ❑**No** Does the project involve ecosystem and fisheries restoration and protection?

Criterion #3: Project Status/ Project Readiness

Technical and economic feasibility

1. Is this a project under CEQA?

   ❑Yes ❑No

   If yes, what level of CEQA is required?
   What will be the status of completing CEQA by June, 2011? What is the proposed schedule for completing CEQA?

2. Is this a project under NEPA?

   ❑Yes ❑No

   If yes, what level of NEPA is required?
   What will be the status of completing NEPA by June, 2011? What is the proposed schedule for completing NEPA?

3. What are the local and regional permitting requirements (if any), and have they been met? If not, what is the current status of compliance and/or plan for complying with the requirements? If permits are required, when do they expire?

4. Will there be staff available for project implementation, or will they need to be hired?

5. What kinds of planning documents, outside of permitting, are necessary for the project, and are they complete? For example, engineering designs or blueprints, work plan, etc.

6. What other financial resources (internal and/or external) will be available to undertake the project and sustain it beyond the IRWM grant?

7. Does the project proponent have the authority or approval to implement the project (such as landowner approval; approval from governing board; or fee, easement, or license rights)? What will be the status of achieving the appropriate approvals by June, 2011? If approvals have not been granted by June, 2011, what is the proposed schedule for achieving such approvals?

(RFP) Appendix D
Inyo-Mono IRWMP
Project Review and Ranking Worksheet for Planning Committee
Round 1 Implementation Projects

Criterion #1: Inyo-Mono IRWM Plan Requirements

1. Does the project support one or more IRWM Plan objectives? See Appendix A for list of objectives.

   ❑Yes ❑No

   If yes, list applicable objectives (indicate number/letter combinations from Appendix A).

2. Does the project support one or more IRWM Plan Resource Management Strategies? See Appendix A for list of RMS.

   ❑Yes ❑No

   If yes, list applicable Resource Management Strategies (indicate number/letter combinations from Appendix A).

3. Will this project benefit disadvantaged communities? If yes, list DACs that will benefit. (If uncertain which communities quality as DACs, refer to RAP, Planning Grant application, or Project Staff.)

4. Will this project involve or benefit Native American Indian Tribes? If yes, list Tribes and locations.

Criterion #2: Subjective Evaluation Narratives (limit responses to 100 words or fewer)

1. Will this project result in reduced greenhouse gas emissions? If yes, explain how.

2. Will this project contribute to developing or implementing adaptation strategies to respond to climate variability impacts on water resources? If yes, explain how.

3. Are there any expected negative economic or environmental impacts of the project? Please describe.

4. Does the project address public health and safety concerns? Please describe.

5. Will this project contribute to achieving compliance with regulatory requirements?

6. Will this project provide short-term and/or long-term economic benefits? If yes, quantify in terms of how much and for what duration with respect to jobs and local spending.

7. Does the project mitigate existing negative environmental conditions? Please explain.

8. Please indicate your final ranking of this project, considering its position with respect to the other project applications (1 is the highest rank, 25 is the lowest rank):

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Appendix E: Additional project needs in the Inyo-Mono IRWM planning region

The following projects are not being submitted for Round 1 Implementation funding but may be considered by the Group in future implementation funding rounds. These projects have not gone through the project review process by the RWMG, and many projects are still in the conceptual stages. The RWMG felt it was important, however, to include this list as an indication of additional priority needs in the planning region.

1. Refurbish Drinking Water Supply Backup Well

Project Proponent: Big Pine Paiute Tribe of the Owens Valley

In 2002, the Tribe installed a new primary water supply well and relegated the previous main well to backup supply. This backup well has now fallen into disrepair, rendering it unsafe to operate. Examination indicated the well casing needs repair and older parts should be replaced.

Estimated project cost: $30,000

2. Water Line Replacement

Project Proponent: Big Pine Paiute Tribe of the Owens Valley

In 2003, a fire flow study was conducted which determined that the existing water distribution system was not capable of providing the recommended 1,000 gpm for fire protection due to 4" piping along sections of the water distribution system. This project will increase the pipe size to 8" along the inadequate fire flow sections to maintain at least 1,000 gpm for fire flow.

Estimated project cost: $800,000

3. Hydrant Replacement

Project Proponent: Big Pine Paiute Tribe of the Owens Valley

An analysis of the Tribe's water distribution system revealed that there are 62 hydrants throughout the system and the average hydrant is 30 years old. Hydrants have a life expectancy of 40-60 years. 27 of the 62 hydrants are in need of replacement because they have reached the end of their useful life or parts are no longer available. This project will replace hydrants for the protection of the community and surrounding environment.

Estimated project cost: $180,000

4. Irrigation Mainline Replacement

Project Proponent: Big Pine Paiute Tribe of the Owens Valley

LADWP annually delivers irrigation water to the Big Pine Indian Reservation. Unfortunately, the irrigation mainline, located on LADWP property, has numerous leaks resulting in abundant water losses which are credited to the Tribe's uses but which the Tribe never actually receives. This project will replace the mainline to make the irrigation system more efficient.

Estimated project cost: $650,000

5. Wellfield Radius of Influence Study

Project Proponent: Big Pine Paiute Tribe of the Owens Valley

The Big Pine Indian Reservation is located in LADWP's Big Pine Wellfield, and, annually, approximately one-third of LADWP's groundwater pumping is from Big Pine. The Taboose-Thibault Wellfield is adjacent to the Big Pine wellfield and is annually pumped an almost equal amount. The Tribe would like to develop a model depicting a radius of influence of each DWP well in the Big Pine and Taboose-Aberdeen wellfields to better understand the impacts of pumping on the region. This study will assist in the management of groundwater resources in the Big Pine and Taboose-Aberdeen wellfields.

Estimated project cost: $100,000

6. Test for copper content in water

Project Proponent: Birchim Community Services District

Test all homes in Birchim Community Services District for copper content in water. Copper is not in the water, but it can leach copper from piping going into the house. This can vary radically from house to house. California standards require that the District delivers water that falls below the state standard for copper content to each house. Presently we test only 10 houses, and we need to test every house to determine which houses have water above the copper standard.

Estimated project cost: $8,500

7. Infrastructure assessment and repair

Project Proponent: Birchim Community Services District

The District's water delivery piping is very old. We need an engineering study to determine: a) what pipes are leaking, b) what pipes are asbestos and need replacing, c) what pipes are 4” in diameter and need to be replaced with 6” piping, d) what connections need to be made in order to make a complete looped system, d) what additional shut-offs are needed. With this study, the District can begin to replace that portion of piping as necessary.

Estimated project cost: $25,000

8. Bishop Creek Flood Mapping Project

Project Proponent: Bishop Paiute Tribe

Using the remote sensing technique of LIDAR, create a detailed topographic strip map of the lower perennial Bishop Creek in order to define topographic geometry of main and overflow channels in a section from SCE Hydro plan 6 through residential areas of West Bishop, Bishop Paute Reservation and City of Bishop. Funded project could leverage US Army Corps of Engineers hydrology and hydraulic services through Section 22 Water Resources Development Act of 1974 - Planning Assistance to States and Tribes to update flow routing models and increase accuracy of the extent of flooding in lower reaches and to predict the magnitude and reoccurrence of naturally occurring flows from headwaters.

Estimate project cost: $300,000

9. Irrigation Replacement Project

Project Proponent: Bishop Paiute Tribe

Purpose: A subsurface irrigation system was constructed in the 1940s by the BIA for the Bishop Paiute Reservation. The system (approx. 63,000 total lineal feet (12 miles)) is in moderate and in some places, poor condition. Much of the original concrete piping has outlived its useful life. Approximately 28,000 feet (5 miles) has been upgraded to PVC pipe (44% of total). There remains approximately 35,000 (56% of total) lineal feet (7 miles) to be rehabilitated. Several segments of lines are dead and many valves are frozen or poorly functioning.

Project Description: We propose to replace the remainder 35,000 feet (56% of total) of these aged irrigation lines with high pressure plastic irrigation piping (PIP) and new valves. This is a replacement/ efficiency improvement project that will increase the ability to control the water and use in an efficient manner. Aged large diameter mainlines and valving will be the priority for replacement followed by laterals. Completion of this Project will employ local labor to ensure that irrigation water will flow to tribal assignments for years to come, enhancing agriculture, the environment, and the economy.

Proposed project cost: $1,050,000

10. Wastewater Facilities Improvement Project

Project Proponent: Bishop Paiute Tribe

The Bishop Paiute Tribe desires to expand the treatment and wastewater disposal capacity of from 0.85 to 1.2 MGD (million gallons per day) by increasing efficiency of contract treatment operations or by constructing an interconnection to adjacent treatment facilities. It is proposed to increase the treatment capacity to provide for current and future needs of the Reservation for a total tribal capacity of 600,000 gallons per day. The estimated cost of the project is $1,400,000. Almost one half of this amount will be contributed by the Environmental Protection Agency Clean Water Act fund. The Tribe is currently seeking matching funds on the order of $750,000.

Since 1996, the Bishop Paiute Tribe has periodically exceeded their purchased total flow capacity. The tribal growth rate of the last 50 years is 2.4% for population and 1.7% for sewer connections. Based on these rates, it is projected that the Bishop Tribe will need approximately 315,000gpd of additional capacity in the next 20 years. The current contract provider of treatment has no additional capacity to sell the Tribe because the treatment plant is presently at maximum capacity. All numbers are based on several feasibility studies that have been completed by the Bishop Paiute Tribe and Indian Health Service (IHS).

Estimated project cost: $750,000

11. 400,000 Gallon Reservoir

Project Proponent: Indian Wells Valley Water District

A new 400,000 gallon welded steel storage tank will be constructed in Ridgecrest, CA to increase storage in the District's "D" pressure zone.

Estimated project cost: $1,500,000

12. Main Line Replacement

Project Proponent: Indian Wells Valley Water District

Main line replacement enables the District to replace old or undersized main line to improve operating efficiency, improve water quality and improve fire flow.

Estimated project cost: $1,000,000

13. Well Plant for New Well

Project Proponent: Indian Wells Valley Water District

Construction of permanent pumping plant facilities for new Well 34. This project includes a masonry building and underground piping.

Estimated project cost: $630,000

14. Brackish Water Treatment Plant

Project Proponent: Indian Wells Valley Water District

Construction of a brackish water treatment facility in the Indian Wells Valley to utilize what is currently nonpotable water to increase the valley's water supply.

Estimated project cost: $24,000,000

15. Water Quality Treatment Plant

Project Proponent: Indian Wells Valley Water District

The project is to build one water treatment facility in the Indian Wells Valley for the District and U.S. Navy to handle any future water quality issues.

Estimated project cost: $80,000,000

16. Aquifer Testing Program

Project Proponent: Indian Wells Valley Water District

This project would set up a series of aquifer tests in the areas where the groundwater flow model is lacking in real aquifer data. These areas include the Southwest, Central (Intermediate Area), Eastern (eastern edge of the deep aquifer), and along the northwestern canyon mouths. Most of the aquifer data used to model the groundwater conditions in the groundwater flow model were projected using geologic logs and drillers reports. Actual aquifer tests will add certainty to the model and refine its use as a groundwater management tool.

Estimated project cost: $120,000

17. Storm Infiltration System

Project Proponent: Indian Wells Valley Water District

Study to predict the feasibility of capturing surface water during rain events and percolating that water into the aquifer system instead of losing the water to the playa lakes where the majority evaporates. Groundwater depths in the "recharge" areas of the Valley are fairly deep and percolation ponds may not be feasible due to vertical migration rates, evaporation rates, etc. However, some water could possibly be captured and percolated in the eastern areas of the Valley where groundwater levels are fairly shallow but of lower quality. The effort could shed some light on the endless possibilities of water capture, retention, detention, infiltration, re-injection, treatment, and re-use of surface water flowing through the Valley and not be utilized.

No estimated project cost

18. Water Collection Galleries

Project Proponent: Indian Wells Valley Water District

Study to provide the feasibility of installing water collection systems along the Sierra Nevada Front. Study could provide insight to the potential of recharging water migrating from the canyons to aquifer system(s) along the Sierra Nevada. The possibility of installing water-collection systems at some of these key locations could supplement the existing supply that might otherwise be lost to evaporation or migration into the Sierra Nevada fault, etc. Key locations include Indian Wells Canyon, Grapevine Canyon, Sand Canyon, NoName Canyon, and Nine-Mile Canyon.

No estimated project cost

19. Southwest Area Hydrogeologic Study

Project Proponent: Indian Wells Valley Water District

This project would follow-on to the most recent AB303 Project where we drilled eight new monitoring wells and sampled over 75 sites in the Valley. The eight wells drilled in the AB303 Project generally showed fairly good water quality characteristics, pluvial/fluvial and lacustrine depositional environments and could be a potential water production area for the Valley. Additional data are needed in the area which include additional wells to the south and west of the existing monitoring wells, additional water sampling efforts, future aquifer tests (two are scheduled to be performed by the Navy in 2011) using the AB303 Project wells, and possibly some shallow geophysical surveys.

No estimated project cost

20. Irrigation Replacement

Project Proponent: Lone Pine Paiute-Shoshone Tribe

The irrigation system was installed in the 1940s by the Bureau of Indian Affairs as part of the 1934 Land Exchange. The system, well over 25 years old, is in serious need of rehabilitation and/or replacement. Pipe failures and cracking has been seen and affects the operation of the system. The overall project goal is system replacement. Currently, LPPSR's irrigation mainline runs approximately 5,200 feet from east to west and consists of many different pipe sizes. A replacement of the system would allow it to flow properly and provide the necessary amounts of water for assigned and tribal lands. The main objective is to replace the old system with newer parts to guarantee effective operation for meeting future demands.

Estimated project cost: $167,400

21. Main Line Replacement

Project Proponent: Lone Pine Paiute-Shoshone Tribe

The original distribution system was put in by the Bureau of Indian Affairs in the 1940s and consisted of various pipe widths: 5", 4", 3", 2" and ½" pipes, which ultimately failed after certain periods of time. In 1990, approximately 5 miles of the mainline were replaced with 4", 6" and 8" pipes to replace failing sections and to expand the system. According to a 1999 investigation, many of the main lines were reaching the end of their service life and were recommended for replacement. Today, it is very evident that the mainline needs to be replaced to not only adequately supply water to homes and tribal operations, but to also ensure the system does not fail if and when fire hydrants are used to suppress fires. Project goal is to repair or replace damaged mainlines to ensure their continued use and operation of the system to maintain its capacity to supply homes and tribal operations. Overall project objective is to meet the demands of a growing population and to allow access for new home construction and future economic development.

Estimated project cost: $308,000

22. Storage Tank

Project Proponent: Lone Pine Paiute-Shoshone Tribe

Initial construction of water storage tanks for LPPSR took place at various stages. There are currently three (3) storage tanks that supply water for domestic use. These storage tanks are located within reservation boundaries and operate on a gravity flow and pressurized system. The pressurized system mainly feeds the western half of the reservation, which has resulted in expensive utility bills to keep the system operational. The main goal of the project is to move the water storage tanks 3000 feet west of their current location to the base of the Alabama Hills to enable the whole system to completely operate by gravity flow, thus reducing the costs to operate. An end result of relocating the water storage tanks is to ensure that LPPSR will/can meet the needs/demand of a growing population and allow for easier access when new homes are built.

Estimated project cost: $849,000

23. Well Rehabilitation

Project Proponent: Lone Pine Paiute-Shoshone Tribe

The construction of domestic wells took place more than 25 years ago. In 1999, an inventory and inspection of the wells was conducted and noted that all wells are either in need of being updated and/or replaced. Despite the repairs that have occurred throughout the years, they continue to be problematic. During the initial inspection of the wells in 1999, it was noted that no rehabilitation work or diagnostic testing has ever been done. The goal of the project is to improve the function and operation of the wells to improve water quality conditions. An overall objective of the project is to sustain an adequate supply of water that can meet the capacity of future demands and reduce the costs needed for untimely repairs.

Estimated project cost: $391,200

24. MCWD Water Main Replacement

Project Proponent: Mammoth Community Water District

The Mammoth Community Water District (MCWD) water distribution system includes several thousand feet of aging water distribution mains that are subject to increasing leakage and repairs. Unaccounted for water loss volumes within the MCWD water distribution system are estimated at about 15%, exceeding the industry standard of 5%-10%.

The California Urban Water Conservation Council has identified leakage location and repair as a Best Management Practice that results in significant water conservation and more efficient use of available water supply.

MCWD proposes to remove and replace 12,000 lineal feet of aging water distribution mains with new Ductile Iron Pipe and appurtenances per current AWWA standards. The pipeline replacement will result in decreased water losses and increased operational efficiency.

Estimated project cost: $1,900,000

25. Mammoth Basin groundwater and spring monitoring at UC Reserve

Project Proponent: Mammoth Community Water District

Increase the understanding of the Mammoth Creek groundwater basin and spring flow in the UC Valentine Reserve. Project will involve collaboration between UC Reserve Manager and the District to develop a groundwater and spring flow monitoring program by installing piezometers and spring flow gauges. Data will be used to examine whether there are links between District water diversions and groundwater pumping and groundwater levels and spring flow on the Reserve property.

Estimated project cost is unknown

26. Mammoth Creek flow measurement improvements

Project Proponent: Mammoth Community Water District

Increase public understanding of the Mammoth Creek Watershed, assist with maintaining healthy fish flows, and improve Mammoth Creek flow data acquisition at the Hwy 395 bridge by installing a live link with SCADA (Supervisory Control and Data Acquisition). It is intended to partner with LADWP on this project.

Estimated project cost is unknown

27. Master plan to expand distribution of recycled water

Project Proponent: Mammoth Community Water District

The District's recycled water program included plans to deliver water to the two golf courses and Shady Rest Park in Mammoth. The District would like to develop a plan to optimize the distribution of recycled water resources in the greater MCWD service area. A plan will include consideration of the economic and supply aspects of expanding distribution. This plan will inform planning efforts to meet future water supply demands.

Estimated project cost is unknown

28. MCWD Expansion of Recycled Water Distribution Pipe Project

Project Proponent: Mammoth Community Water District

The Mammoth Community Water District's ability to serve the community with a reliable water supply is currently challenged during multiple drought years. In May 2007, the Town of Mammoth Lakes completed a comprehensive update to their General Plan, reporting that land development under the approved General Plan would result in significant water supply deficiencies in a dry year.

To help ensure that future water needs can be met in a reliable and sustainable manner--particularly during drought periods--the District has developed a recycled water program to provide treated wastewater for landscape irrigation which would otherwise create a demand on potable water supplies during the summer.

The Mammoth Community Water District (MCWD) proposes to install six-inch diameter ductile iron pipe and associated appurtenances to expand the distribution of recycled water. Included in the project are installation of pumps, pipelines, meters and monitoring devices in compliance with the approved MCWD Recycled Water Project EIR and the requirements of Title 22.

This project would significantly conserve potable water resources in the Mammoth Creek watershed through beneficial re-use of treated wastewater.

Estimated project cost: $2,000,000

29. MCWD Meridian Boulevard Sewer Main Replacement Project

Project Proponent: Mammoth Community Water District

The Mammoth Community Water District (MCWD) proposes to remove and replace approximately 1,900 feet of aging sewer main pipeline and install 6,600 feet of new sewer main pipeline along portions of Meridian Boulevard in the Town of Mammoth Lakes. The pipeline replacement targets existing asbestos cement pipe threatened by structural failure due to hydrogen sulfide corrosion exasperated by low slopes and high flows. At least one such failure has already occurred along the targeted pipeline. The proposed new pipeline alignment and installation would extend the existing sewer main along Meridian Boulevard and circumnavigate flows around old asbestos pipe currently in use.

Estimated project cost: $2,400,000

30. MCWD Treatment Plant Arsenic Removal Project

Project Proponent: Mammoth Community Water District

The Mammoth Community Water District (MCWD) Groundwater Treatment Plants #1 and #2 are experiencing treatment failures resulting in arsenic levels as high as 13 ppb. The California Department of Public Health (CDPH) requires arsenic maximum contaminant levels (MCL) to be below 10 ppb at all times. Per CDPH requirements, MCWD has announced Tier II public notification of the exceedence of the arsenic MCL.

Additionally, MCWD customers have seen a continued exceedence of the Safe Drinking Water Act (SDWA) Lead and Copper Rule. CDPH has mandated that MCWD implement the results and recommendations of a recent Corrosion Control Study to achieve SDWA compliance for the Lead and Copper Rule. MCWD has already given Tier II public notification to District customers regarding non-compliance with the Lead and Copper Rule.

To achieve compliance with the Lead and Copper MCL rule, MCWD proposes to add aeration systems to adjust the ph of the plant effluents. The Department of Public Health has initially approved this treatment alternative.

To achieve compliance with the arsenic MCL rule, MCWD has retained the services of HDR engineering to evaluate the best available treatment option for arsenic removal.

To achieve the most cost-effective and timely implementation, MCWD will incorporate both the ph control and the arsenic removal improvements into a single design and construction contract.

Estimated project cost: $5,600,000

31. Improve Mammoth Creek low flow measurement at Twin Lakes

Project Proponent: Mammoth Community Water District

Improve the ability to measure surface water in the Mammoth Lakes Basin. The current measurement weir between Twin Lakes and Mammoth Creek does not provide reliable low flow measurements. Replacing the weir will improve data reliability for managing surface water resources. This project would likely involve a partnership between MCWD, USFS and CalTrout.

No estimated project cost available

32. MCWD Well Rehabilitation (Phase 1 & 2)

Project Proponent: Mammoth Community Water District

Due to aging infrastructure, Mammoth Community Water District (MCWD) water supply wells are exhibiting a declining efficiency and loss of production capacity impacting the ability of MCWD to meet current water supply demands. If Phase 1 provides reasonable implementation measures for well improvements, the District will implement these measures. In addition, the District will expand Phase 1 to profile and conduct feasibility studies for the remaining production wells. Groundwater wells supply approx. 50% of MCWD's water demand. Loss of well production could cause severe short term water supply shortage and result in non-compliance with Department of Health requirements to maintain reserve capacities.

This project would improve the production and reliability of the MCWD supply wells by improving the wells and pumping efficiencies.

Estimated project cost: $300,000

33. Storm drain improvements

Project proponent: Town of Mammoth Lakes

Provide drainage improvements as shown in the stormwater master plan. Replacing existing corrugated metal pipes that require replacement due to corrosion. This would be performed over a 20-year period.

Provide improvements to stormwater discharges and implement best management practices in strategic locations in Town. This includes preparation of updated design standards, stormwater master plan updates, development of water quality standards, as well as construction of improvements to improve stormwater quality and reduce erosion problems.

Estimated project cost: $41,700,350

34. Treatment and Reuse of Fish Hatchery Effluent

Project Proponent: Inyo County

Phase I. Fish Hatcheries in Inyo and Mono Counties use large quantities of water and produce effluent of low quality. This study would determine the feasibility of treating hatchery effluent, thereby reducing water use by the hatcheries and improving water quality. The study would evaluate the water quality of hatchery discharges, investigate applicable technologies for treating hatchery effluent to a standard such that it could be reused by the hatcheries, and assess the costs and feasibility of implementing such technology at Inyo/Mono hatcheries.

Phase II. Implementation and operation of technologies identified as feasible in Phase I.

Estimated project cost is unknown

35. Lower Owens River Monitoring Wells

Project Proponent: Inyo County

The Lower Owens River project is a joint Inyo County/LADWP project that introduced flow into sixty miles of river channel to establish a healthy riverine-riparian ecosystem. This project would construct eighteen shallow monitoring wells along three transects across the Owens River to monitor the water table in the Lower Owens River floodplain to assess effect of LORP baseflows and seasonal habitat flows on the water table in areas that are targeted for recruitment of woody riparian species. This would assist in the management of flows for maximum development of a willow/cottonwood riparian corridor.

Estimated project cost: $500,000

36. Lower Owens River Tule Control

Project Proponent: Inyo County

The Lower Owens River project is a joint Inyo County/LADWP project that introduced flow into sixty miles of river channel to establish a health riverine-riparian ecosystem. Flow was introduced in the river in December, 2006, and as the project has since evolved, it has become apparent that there has been excessive tule encroachment on the channel. This project will investigate tule control methods and implement the most cost effective means. The project will be phased as 1) investigation of methods, 2) testing of viable methods identified in 1), and 3) operational implementation.

Estimated project cost: Phase 1: $300,000; Phases 2&3: unknown

37. Use of precipitation and groundwater by native phreatophytes

Project Proponent: Inyo County

Water management on LADWP land in the Owens Valley is conducted to maintain certain vegetation standards. In order to manage groundwater pumping so that these standards are met, it is necessary to know the relative use of precipitation versus groundwater by phreatophytic plant communities that may be affected by groundwater pumping. This study would sample isotopes of oxygen and hydrogen to determine the ratio of precipitation to groundwater in plant tissue. The isotope measurements would be combined with micrometeorological measurements of overall evapotranspiration to determine the amount of groundwater used by plants.

Estimated project cost is unknown

38. Saltcedar Control on Lower Owens River

Project Proponent: Inyo County

Inyo County and LADWP have an ongoing effort to control saltcedar on the Lower Owens River and other LADWP lands to facilitate development of willow and cottonwood in the riverine/riparian corridor of the Owens River. This project would fund the program for three years. Inyo County is currently funding this work through a three-year $600,000 grant from the Wildlife Conservation Board that expires in 2010. The proposed grant would continue the program for an additional three years.

Estimated project cost: $600,000

39. Remote Sensing of Owens Valley Vegetation

Project Proponent: Inyo County

Inyo County and Los Angeles have entered into a long-term water management agreement. One of the provisions of this agreement is to manage groundwater pumping to prevent declines in phreatophytic vegetation cover, and to prevent grass-dominated communities from converting to shrub-dominated communities. In order to determine whether these goals are being met, it is necessary to conduct ongoing vegetation measurements in the Owens Valley. The Inyo/Los Angeles Technical Group has conducted annual vegetation surveys using ground based methods; however, these methods are time-consuming and expensive to implement in such a large management area. Remote sensing has the capability to provide spatially extensive measures of vegetation abundance and, if possible, species composition, would provide a more efficient, spatially extensive, and reproducible method of measuring vegetation. This project would be conducted by RFP/RFQ, so the estimated project cost is rough.

Estimated project cost: $500,000

40. Mono City Water Supply Improvements for Fire Suppression

Project Proponent: Lundy Mutual Water Company

There is only one electric supply power line to Mono City. This single line is susceptible to winter storms, ice storms, summer thunderstorms, and damage from fire. Loss of power during firefighting efforts jeopardizes the ability of fire trucks to refill when the electrical pump that runs the well and distribution stops working. In addition, Mono City has only one water storage tank. In the event of a major fire, the single water tank currently present does not meet the need for increased storage capacity.

Power outages occur three to four times a year on average during wind, weather, and fire events. Power loss results in the water system losing pressure as the pump no longer functions to refill the water and pressurize the system. As a result, power loss at the fire station compromises an effective emergency response. This project will provide an emergency generator for the fire station operations and water pump during electrical failure to Mono City Volunteer Fire Department and add a second water storage tank to assure adequate fire suppression supply.

The emergency generator system will provide the power needed to continue water supply operations in emergency events and power needed by emergency response operations including the initial siren and support operations that need electric power. There would also be an external outlet that an Operations for Emergency Services (OES) could plug into for communications and other necessary support services.

This project will install a 40KW emergency standby generator for the Fire Station and a 50KW emergency generator for the Fire Water Pump. Two generators are needed as the water pump has a non-standard configuration. A second generator is needed at the Fire Station to power the siren and to provide an energy source for emergency operations including a plug-in for support of computers, phones, and emergency operations.   Installation will include all equipment, materials, electrical wiring, transfer switch gear, and enclosure to provide protection during inclement weather.

A back up power source will be installed which will prevent loss of water for emergency operations and needs, and provide power to the fire station for emergency response. In addition, a secondary water tank will provide additional water supply storage for fire suppression.

Beneficiaries include Mono City residents, visitors, and property owners. Mono City is a residential community of nearly 100 homes and residents. The small community relies on local volunteers to respond to structural fire incidents and other emergency events, sometimes without support from neighboring communities with more modern equipment and professionals with advanced skills. Providing this needed equipment to the Mono City Community will reduce risk of injury and loss of property.

Estimated project cost: $99,225

41. Mono City Water Distribution System Assessment and Replacement

Project Proponent: Lundy Mutual Water Company

The water main distribution pipes under the street in Mono City are over 60 years old and subject to persistent leaks, line ruptures, and pressure problems. These problems could be solved by investigating the current condition of the water main distribution pipes, evaluating which sections are responsible, and replacing the damaged sections.

The potable water distribution system in Mono City is antiquated and in disrepair. Persistent leaks from pipes over sixty years old are costly to ratepayers and contribute to an inefficient use of scarce water resources. In addition, water line ruptures endanger the entire distribution system with high pressure variability.

The project will make improvements to the pipe distribution system that will prevent leaks and pipe ruptures and help solve continuing pressure problems.

Estimated project cost is unknown

42. Lee Vining Stormwater Management

Project Proponent: Undetermined. Possible proponents include Caltrans, Mono County, US Forest Service, and the Lee Vining Public Utilities District

Stormwater running off Lee Vining streets, sidewalks, parking lots, and other impervious surfaces is presently directed into several drain areas, some of which erode the hillside below town, wash out the Lee Vining Creek Trail, and reach Lee Vining Creek. This project will mitigate the erosion and sedimentation and pollution caused by these point sources.

Location 1 at wall: When Caltrans widened the highway and built the wall at the south end of Lee Vining, it resulted in a new hillside and trail erosion problem. It mitigated the problem somewhat by installing a perforated pipe below the wall that infiltrates the first flush of stormwater into the soil, and after reaching capacity spills into a pipe that emits stormwater into a side channel of Lee Vining Creek at the bottom of the hill. On more than one occasion during rain events, foam has been observed being discharged from this drain into the creek side channel, which could discharge pollutants into the active channel.

Location 2 at Shell Station: Currently the stormwater exiting the pipe at the bottom of the fill slope adjacent to the Shell Gas Station is discharged onto a flat terrace which absorbs most if not all of the flow. The drainage area below this pipe should be evaluated for capacity and potential problems.

Location 3 at First Street: Caltrans installed a clarifier in the Caltrans Yard, which removes trash, oil, and sediment from stormwater running off the highway near First Street. This "clarified" water is joined by untreated stormwater from the drain at the corner of First St. and Mattly Ave, and the combined flow exits a pipe below the large turnout at the end of First St. This water flows through a small pipe under a dirt road on this terrace, which washes out frequently. It then runs down an actively-eroding gully, and exits the gully in a large alluvial fan which crosses the Lee Vining Creek Trail, at times washing it out, and discharges to Lee Vining Creek. The amount of trash reaching the trail and the creek has been reduced since Caltrans installed the clarifier, but the erosion, sedimentation, and pollution is still a problem.

Location 4 at Community Center: When the Lee Vining Community Center was built, the drainage was directed over the side of the hill, and within a year or two a gully formed along with a fan of sediment on the terrace below adjacent to the sewer ponds. The drainage from the parking area has been directed elsewhere, however the drainage from behind the building still is directed down this gully, causing erosion and sedimentation.

Location 5 at USFS Visitor Center: The drainage from the employee parking lot and access road is directed down a gully which ends in a fan adjacent to Lee Vining Creek. The Lee Vining Creek Trail crosses this gully on a bridge, and the flow rarely reaches the fan at the bottom, however currently there appears to be significant erosion of the hillside below the employee parking lot and access road caused by poorly-directed drainage from the gutters along the road.

This project will evaluate each location, develop alternatives for dealing with each problem, and construct the chosen alternatives.

- Analysis of each problem area and alternative solutions will be presented in a report for decision-makers to use in selecting the best alternatives.
- Each solution will be constructed in order to prevent erosion, sedimentation, and pollution.
- Each solution will be monitored for two years to determine its effectiveness and adaptive measures will be taken to improve the solutions during this time.
- A plan will be developed to mitigate or eliminate any new sources of stormwater from new construction or redevelopment in Lee Vining through detention basins and construction of permeable surfaces.

Estimated project cost is unknown

43. Lee Vining Sewage System Improvements

Project Proponent: Lee Vining Public Utilities District

The Lee Vining sewer system is a gravity-flow system that drains to a large septic tank. The septic tank is pumped out periodically and the effluent drains to several open ponds for infiltration/evaporation.

The sewer system experiences frequent plugs and failures that result in several sewage spills in Lee Vining each year. These spills negatively impact the town and have the potential to run down storm drains into Lee Vining Creek. In addition, the smell from the open effluent ponds negatively impacts users of the Lee Vining Community Center, Hess Park, the Lee Vining Creek Trail, and adjacent areas.

The project will make improvements to the sewer system that will prevent and capture sewage spills and mitigate the severe odor problem near the Community Center.

Estimated project cost is unknown

44. Lee Vining Water Main Replacement

Project Proponent: Lee Vining Public Utilities District

The Lee Vining water system is a gravity-flow system from springs in Lee Vining Canyon, to two water tanks near the Lee Vining Ranger Station, to the town of Lee Vining.

On March 6, 2005, the water main broke at the top of the hill above the SCE substation. Water running down the hill caused a mudflow to cross the highway and reach Lee Vining Creek, closing the highway for a few hours and muddying the creek and disrupting water service. At other times water mains break in town, causing loss in water service and requiring emergency repairs. This threatens water quality, public safety due to disruptions in fire protection, and has negative effects on soil and water conservation along the route of the water main.

The project objective is to replace all the aging and deteriorating water mains in the Lee Vining water system.

Estimated project cost is unknown

45. Lee Vining Water Meter Installation

Project Proponent: Lee Vining Public Utilities District

Lee Vining does not have water meters. It currently has two water tanks along Lee Vining Creek near the Ranger Station.

Due to lack of water meters, water users in Lee Vining have no incentive to conserve water. High water use during the summer resulted in the water level in the water tank becoming low at times, and caused the district to install a new water tank adjacent to the existing one along Lee Vining Creek, resulting in a loss of riparian habitat. New development proposals would increase peak demand and stress the existing water system.

Install water meters for each water user. The district could then implement water conservation pricing and discourage excessive water use, resulting in a more reliable water supply without having to add new storage.

Estimated project cost is unknown

46. Rush Creek Floodway Improvements

Project Proponent: Undetermined. Possible proponents include the Los Angeles Department of Water and Power or the State Water Resources Control Board

During Rush Creek flood events, Silver Lake can back up and flood Hwy 158 (and occasionally back up Reversed Creek as far as the Double Eagle Resort, such as the 1000 cfs 1967 flood, a 150-year event). Above a flow of roughly 500 cfs (downstream of Silver Lake), a 10-year flood, the culverts above Silver Lake under the highway are full. Higher flows to 750 cfs (a 7-year flood without SCE's control) would be beneficial for riparian habitat restoration downstream.

SCE manages its reservoirs in order to minimize uncontrolled spills, which has the result of minimizing flows above 500 cfs. Higher flows do occur rarely, such as in 1967, and flood property and roads. Structural improvements to increase the capacity of the floodway at Silver

Lake would allow SCE to release higher flows from its upstream reservoirs, which would benefit riparian habitat restoration downstream.

Increase the capacity of the Rush Creek floodway at Silver Lake in order to minimize flooding and maximize peak flow events up to 750 cfs that benefit the riparian ecosystem.

Estimated project cost is unknown

47. Mono Lake Evaporation Study

Project Proponent: Undetermined. Possible proponents include the Los Angeles Department of Water and Power (LADWP), the State Water Resources Control Board SWRCB), the Great Basin Unified Air Pollution Control District (GBUAPCD), and the Mono Lake Committee (MLC)

There is a need for an updated evaporation estimate for Mono Lake. Climate change has increased lake temperatures and presumably evaporation and a new estimate is needed for use in the Mono Lake water balance models.

Mono Lake is currently rising to a stabilization level of 6392 feet above sea level. This level, ordered by the SWRCB and implemented by LADWP, is expected to bring air quality into compliance with federal standards. The GBUAPCD is required to bring air quality into compliance. Recent lake levels indicate a slow trend in lake level rise, however preliminary analysis suggests this is not out of the range of variation predicted by the models. A cooperative effort is underway to update the models and a new evaporation estimate is needed, since evaporation is not measured and it is the largest single component of the water balance.

Update the evaporation estimates for Mono Lake for use in updated models that will provide updated lake level forecasts.

Estimated project cost is unknown

48. CSA-2 Sewer System Evaluation

Project Proponent: Inyo County Department of Public Works

The CSA-2 sewer collection system is in dire need of renovation because of continued seepage, reoccurring blockages and infiltration inflow. These conditions have created a situation where costs for system maintenance and effluent treatment are high and also create a potential for significant environmental impacts. The collection system has not been evaluated since the late 1970s and no accurate plans for the system exist. The proposed system evaluation would map and measure the entire system as well as camera the existing main lines to document the existing condition and problem areas in the sewer mains. Following the map and measure portion of the evaluation, plan and profile drawings would be created and these drawings would be used to develop recommendation for rehabilitation of the sewer system. The preliminary engineering report prepared as part of the proposed evaluation is often required for application for State and Federal Grant and Loan Programs. The system is a community-owned and County-operated sewer collection system and is located in Aspendell east of Bishop, CA.

Estimated project cost: $70,000

49. Laws, Independence, and Lone Pine Water Systems Master Plan

Project Proponent: Inyo County Department of Public Works

Laws, Independence, and Lone Pine are disadvantaged communities. The Laws, Independence, and Lone Pine Town water systems are in need of a Master Plan / Needs Assessment which could answer basic questions about how to operate the systems effectively and economically but yet set aside enough reserves to meet both anticipated and unforeseen needs. The assessment would include a hydraulic analysis of the systems addressing fire flow needs and maximum day demand needs. The assessment may also include a staffing plan identifying the number of office and field staff necessary to carry out operations of the system and identify specific tasks to each staff member. The assessment should also identify all current and anticipated future regulatory requirements a water purveyor must meet. These regulations encompass California Occupational Safety and Health Administration requirements to Certified Unified Program Agency regulations to Air Quality regulations and Public Health Department regulations. Capital improvements could be identified over a five, ten and twenty year horizon. The estimated cost for the project is based upon cost estimates received for a hydraulic analysis and water rate study and the estimated costs of County personnel providing requested data to the successful contractor.

Estimated project cost: $200,000

50. Laws, Independence, and Lone Pine ultra-low flush toilet replacement project

Project Proponent: Inyo County Department of Public Works

Laws, Independence, and Lone Pine are disadvantaged communities. The Laws, Independence, and Lone Pine ultra-low flush toilet replacement project shall provide a rebate to customers who purchase and install Ultra-Low Flush toilets in their homes as a water conservation measure. The program may be administered as follows: the customer would purchase a toilet from a pre-defined list of appliances with a rebate amount determined by the particular model chosen. After an inspection of installation by the County, a rebate would be applied to their water bill and carried forward until the rebate amount was exhausted. The estimated number of toilets replaced would be 1.25 toilets per service with a maximum rebate of $100 per replaced toilet applied to their water bill. Some residents may replace all their toilets while others may not replace any toilets. The estimated cost for the project could be $119,000 for 1.25 toilets for every 952 services and approximately $30,000 for project administration for a total project estimate of $149,000. Alternatively, rather than applying the rebate to the water bill, a rebate card valued at $100 may be issued.

Estimated project cost: $149,000 – 170,000

51. Laws, Independence, and Lone Pine Condition Assessment and Leak Detection Survey

Project Proponent: Inyo County Department of Public Works

Laws, Independence, and Lone Pine are disadvantaged communities. The Laws, Independence, and Lone Pine Condition Assessment and Leak Detection Survey shall provide a condition assessment of pipeline integrity and leak detection of all mains in the three town water systems. The project shall also provide funds to excavate and repair leaks and unmetered services discovered by this Project. The project may help to conserve water lost by leaks and un-metered services while the condition assessment may help to prioritize capital improvements. The estimated cost for the Condition Assessment and Leak Detection Survey may be $200,000 over the total of approximately 20 miles of mains in all three water systems. An additional $50,000 could be included to remedy the defects discovered. Administration of the project may cost approximately $50,000.

Estimated project cost: $300,000

52. Laws, Independence, and Lone Pine Rate Study

Project Proponent: Inyo County Department of Public Works

Laws, Independence, and Lone Pine are disadvantaged communities. The Laws, Independence, and Lone Pine Rate Study shall build upon the Water Master Plan / Needs Assessment Project and the Condition Assessment Project by preparing a Water Rate Study to investigate identified funding needs by the previous Projects and how to fund them. The estimated costs for this project, keeping in mind the previously completed studies, may be about $50,000 which also includes Administration costs. The Water Master Plan, Conditions Assessment, and Rate Study Projects may be completed within one round of funding.

Estimated project cost: $50,000

53. Lone Pine Transmission Main Project

Project Proponent: Inyo County Department of Public Works

Lone Pine is a disadvantaged community. This Project would install about 4,300 lineal feet of 16 inch ductile iron pipe. Approximately 800 lineal feet of the current transmission main are above ground paralleling the creek within 2 feet of the creek, cross under the creek bed or are adjacent to tributaries to Lone Pine Creek. The existing main has a joint in the pipe where it crosses a gully and the joint in the pipe is sagging in mid air. The pipe is also very thin, probably about 5 gage or about 3/16" thick. The new main would primarily be within public rights-of-way and far away from the creek while the existing main is entirely on Public Lands or LADWP land. The new main would also cross the LADWP Aqueduct.

Estimated project cost: $3,000,000

54. Independence Transmission Main Project – 1

Project Proponent: Inyo County Department of Public Works

Independence is a disadvantaged community. This Project would replace the Independence Water Transmission Main from the tanks to the old Chlorination Vault, a distance of about 2,600 lineal feet. The current main has 2,135 feet of old steel main that was used material when it was installed in 1928. A leak in the main in 1991 started as a pin-hole diameter sized leak which grew eventually to 200 lineal feet replaced as none of the adjacent pipe was of sufficient integrity to permit attachment without causing more leaks. This project would also add a 12" meter providing more fire flow to the town to the existing 8" Town Demand Meter. The current Transmission main is of 10" and 12" construction. This project would replace all pipe with a 16" main of ductile iron.

Estimated project cost: $1,500,000

55. Independence Transmission Main Project – 2

Project Proponent: Inyo County Department of Public Works

Independence is a disadvantaged community. If the Independence Transmission Main Replacement Project is not approved for Round 2, this Project would survey the existing Independence transmission main for elevation and at the discovered high points and points of inflection on the main install double 2" air release valves. There is one known and several suspected high points trapping air within the transmission main. It also would remove an existing in-line meter in the transmission main that does not turn which impacts flows. These defects impede the delivery of large volumes of water during times of high demand such as a fire. There is suspected air in the distribution system potentially causing an air lock affecting a portion of the upper end of the distribution system. This project also adds a 12" meter to the existing 8" Town Demand Meter. This project may remedy the above referenced defects and provide more fire flow to the town.

Estimated project cost: $110,000

56. Independence Well 384 Transmission Main Project

Project Proponent: Inyo County Department of Public Works

Independence is a disadvantaged community. This project will install about 2,000 lineal feet of 12” ductile iron main from Well 384 to the end of the existing 12” main on Pavillion Street. The existing main is 6” and 8” and would be supplemented with the 12” main. This may increase flows to the upper corner of the distribution system enhancing fire flows and providing added reliability.

Estimated project cost: $750,000

57. Independence Bypass Line Project

Project Proponent: Inyo County Department of Public Works

Independence is a disadvantaged community. This project will install about 300 lineal feet of 8” PVC main from the existing transmission main to the retention basin providing an orderly controlled means of discharging un-consumed water from the town into the concrete lined retention basin for evaporation when both water tanks need to be taken off-line. It protects the adjacent stream.

Estimated project cost: $20,000

58. Laws, Independence, and Lone Pine Pressure and Air Relief Improvements Project

Project Proponent: Inyo County Department of Public Works

Laws, Independence, and Lone Pine are disadvantaged communities. This project shall install a 4” pressure relief valve in both Independence and Lone Pine town water systems, install at least two air relief valves in all three Town distribution systems each, and the community of Laws may receive an additional fire hydrant and a 2” blow off. These improvements shall increase reliability in all three Town water systems as their currently are no air release valves in any of the systems while both the Independence and Lone Pine systems may see pressures in excess of a customary pressure during emergencies.

Estimated project cost: $60,000

59. Alternative Lone Pine Transmission Main Project

Project Proponent: Inyo County Department of Public Works

Lone Pine is a disadvantaged community. If the 4,300 lineal foot Lone Pine Transmission Main Project is not approved, this Project may install about 2,000 lineal feet of 16” ductile iron pipe bypassing the tributaries to Lone Pine Creek, pass along public rights-of-way and pass into LADWP land and reconnect with the existing transmission main west of the aqueduct preventing the need for a new aqueduct crossing. Approximately 800 lineal feet of the current transmission main are above ground paralleling the creek within 2 feet of the creek, cross under the creek bed or are adjacent to tributaries to Lone Pine Creek. The existing main has a joint in the pipe where it crosses a gully and the joint in the pipe is sagging in mid air. The pipe is also very thin, probably about 5 gage or about 3/16" thick and of unknown age. This alternative project would remedy the above defects but it would still require LADWP approval and possibly federal approval.

Estimated project cost: $1,500,000

60. Lone Pine Distribution System Fairbanks Roy Rogers Loop Project

Project Proponent: Inyo County Department of Public Works

Lone Pine is a disadvantaged community. This project installs about 3,000 lineal feet of 12" ductile iron pipe from West Bush Street around Fairbanks Avenue to south Brewery St via Roy Rogers Road, completing a loop of the main supply main into the distribution system. By installing this main, the system has a second means of providing the Town with water should an existing 1,500 lineal foot section of 16 inch main become unusable for any reason. This project improves the reliability of the Lone Pine water system and provides flexibility in operation.

Estimated project cost: $1,500,000

61. Lone Pine East Locust Street Water Main Project

Project Proponent: Inyo County Department of Public Works

Lone Pine is a disadvantaged community. This project installs about 900 lineal feet of 8" ductile iron pipe along East Locust Street from the ally east of Main St passing two public schools to Lone Pine Avenue. It also reconnects the Southern Inyo Hospital domestic and fire services from the old 6" main in Locust Street to the new 8 inch main installed in 2002. Public school domestic services are also reconnected to the new main. By completing this project, the reliability of the system both in the northern part of Lone Pine and along East Locust Street to Southern Inyo Hospital will be improved as will the domestic services to the public schools and domestic and fire suppression services to the hospital. This project improves the reliability of the Lone Pine water system and directly benefits two public schools, the local hospital and provides flexibility in operation.

Estimated project cost: $110,000

62. Laws, Independence, and Lone Pine Backflow Prevention Survey

Project Proponent: Inyo County Department of Public Works

Laws, Independence, and Lone Pine are disadvantaged communities. This project will survey all services in the three towns and check for the presence of proper backflow devices or the necessity of backflow devices on premises served by the water systems. A similar survey was conducted in 2001 and several changes to commercial services have occurred in that time. This project directly impacts the health and well being of the public in all three towns.

Estimated project cost: $140,000

63. Inyo County Buildings and Grounds Backflow Device Repair or Replacement Project

Project Proponent: Inyo County Department of Public Works

Inyo County maintains public buildings and grounds in several Owens Valley towns, primarily in Independence, which have backflow devices. Many of these devices are non-operative. This project builds on the Backflow Device Survey project and repairs or replaces the defective backflow devices serving County buildings and grounds. This project directly benefits the employees and public who conduct business in county facilities as well as the public, both residents and visitors, who use county grounds.

Estimated project cost: $50,000

64. Independence Crockett Street Loop Project

Project Proponent: Inyo County Department of Public Works

Independence is a disadvantaged community. This project installs about 750 lineal feet of 6" PVC pipe and a fire hydrant to loop the distribution system from East Wall Street south on Crockett around to North Clay Street. This project will remove a dead end in the system by creating a loop improving water quality and add a fire hydrant that will improve fire hydrant coverage. It also will reconnect two services to the new 6" main. It will abandon a 1 ½" copper service line that served two residences providing marginal flow.

Estimated project cost: $50,000

65. Laws Auxiliary Well Chlorination Building Project

Project Proponent: Inyo County Department of Public Works

The community of Laws is a disadvantaged community. This project installs a chlorination building at the auxiliary well site. Currently there are no chlorination facilities at the site. The well will be used during periods of high demand and when the domestic well is off-line for repairs, etc.

Estimated project cost: $30,000

66. Laws, Independence, and Lone Pine Swing Check Valve Replacement Project

Project Proponent: Inyo County Department of Public Works

The communities of Laws, Independence, and Lone Pine are disadvantaged communities. This project replaces deteriorated swing check valves at the well sites for all three systems. Currently the existing swing check valves at the well sites are old, and mounting nuts and bolts have disintegrated and occasionally leak chlorinated water back into the well. This impacts LADWP's groundwater monitoring program. The disintegrated nuts and bolts pose a safety hazard to the communities.

Estimated project cost: $40,000

67. Laws, Independence, and Lone Pine Geographical Information Systems Project

Project Proponent: Inyo County Department of Public Works

The communities of Laws, Independence, and Lone Pine are disadvantaged communities. This project creates a Geographical Information System for all three Town water systems. Currently, most water systems data is on paper. Some CAD drawings exist. This project benefits the three town water systems by maintaining all the pertinent information electronically and assists in efficiently operating the system providing a one-stop spot for quickly accessing all information needed during events such as emergencies, repairs, upgrades etc.

Estimated project cost: $100,000

68. Independence and Lone Pine Chlorination Tank Replacement Project

Project Proponent: Inyo County Department of Public Works

The communities of Independence and Lone Pine are disadvantaged communities. This project replaces 40 year old steel chlorination tanks buried underground. As these tanks age, the potential for leaks increase, especially as there are no sacrificial anodes in place to mitigate corrosion. The leaking tanks also pose a health and safety risk to the communities they serve.

Estimated project cost: $1,300,000

69. Laws, Independence, and Lone Pine Sample Site Project

Project Proponent: Inyo County Department of Public Works

The communities of Laws, Independence, and Lone Pine are disadvantaged communities. This project installs dedicated sampling stations within the three Town water distribution systems which helps to comply with the Federal Groundwater Rule and the California Title 22 Water Quality regulations requiring dedicated sample sites within distribution systems. This project installs 25 stations in Independence and Lone Pine and 5 stations in Laws for a total of 55 stations.

Estimated project cost: $40,000

70. Big Slough Agricultural Diversion Dam

Project Proponent: Mono County RCD

Just north of the center of Walker is a diversion dam which is the windpipe through which 10,000 of the 14,000 Antelope Valley irrigated agriculture acres breathe. It is going on nearly a century in age and even its patches are decades old. Were it to fail, the basis of the local economy would be lost, perhaps for a full growing season. Restoration of this dam will be an economic safeguard and an ecological blessing in enhancing the vital fishery on the West Walker River.

Estimated project cost: $700,000

71. Wastewater Pond Reclamation & Conveyance

Project Proponent: Mammoth Mountain Ski Area

MMSA currently operates its Main Lodge area waste facility through the system of wastewater settling ponds. Both the State Water Quality Division of Lahontan and the USFS agree that this is not the best and proper way of managing solid waste water and that conveyance to the municipal system is best. However, it is very costly to install the conveyance lines, pay the connection fees, and to reclaim the land. Therefore, Mammoth continues to meet all of the State standards for the management of settling ponds until a viable option or financial assistance is put in place.

Estimated project cost: $7,000,000

72. MMSA, Town of Mammoth Erosion and Flood Improvements

Project Proponent: Mammoth Mountain Ski Area

MMSA is topographically above the Town of Mammoth Lakes. The elevation change and topography create severe erosion and channeling on impermeable streets that then flood into lower lying areas of the Town. The Town has done initial studies to identify areas of improvement and the Mountain is willing to partner in improvements but the cost is prohibitive given the fact that these extreme events occur infrequently or in major flood events. However, they are still causing erosion and sediment issues when they occur and can be prevented given financial assistance to fun the infrastructure improvements.

Estimated project cost: $1,500,000

73. June Beetle Tree Kill Erosion prevention

Project Proponent: Mammoth Mountain Ski Area

Mammoth Mountain owns and operates June Mountain. June Mountain is currently battling a severe beetle infestation which is killing thousands of trees. In order to operate the ski area all dead hazardous trees adjacent to the runs must be removed. This season, more than 450 trees have already been removed. The removal of trees creates water quality issues due to sediment and erosion. JMSA is currently pursuing grant funding options with the USFS to try to combat this infestation and consequential problems.

Estimated project cost: $1,500,000

74. Keeler Arsenic Treatment Facility

Project Proponent: Keeler CSD

The Keeler Community Service District is located on the Eastern shore of the Owens Dry Lake on Highway 136, 17miles south of Lone Pine California. The community of Keeler is a Disadvantaged Community with a community population of 67 and approximately 58 day workers from LADWP in our commercial district. Keeler CSD system exercises appropriative rights to extract groundwater by virtue of land ownership within an unadjudicated basin, under the regulation of the State Department of Health Services. The CSD system has repeatedly been in violation for Arsenic. No treatment facility exists to remove Arsenic other than POU in most homes. Coli-form has been in violation in recent summers.

Arsenic - Installation of an Arsenic treatment facility with transmission pipeline to tank. Consolidation with other systems not feasible; Keeler CSD is only Community system in at least fifteen miles.

Coli-form – Retention time in tank could be reduced if transmission pipeline were extended directly to tank in lieu of dividing flow from well to consumers and storage tank.

- Types of water sources and current treatment: System receives water through its only well but is high in arsenic. Keeler is currently using POU treatment.

- Physical address of the water system (include a map if necessary):
  Vicinity of Fire House 85 Old State Hwy, Keeler, CA 93530

- Number of persons served (Part C.3 of SRF Planning Funds Application):
  System serves approximately 125 people

- Number of service connections (Part C.4 of SRF Planning Funds Application):
  System has 85 connections (66 active).

- Permit status, including the permit number, issue date, and a list of any amendments
  Permit # 9303601 for Keeler CSD was issued 7/1/93 and has no amendments.

Keeler is a DAC with very limited resources and a volunteer five member board of directors. We would like to be considered for possible funding to perform a feasibility study for an arsenic treatment facility to provide the much needed relief from possible arsenic poisoning. At this time Keeler relies on POU systems that require continual filter replacement at each home. A centralized treatment facility would provide fresh potable water to all the Keeler residents and the larger community that relies on us.

Estimated project cost: $173,000

75. CASGEM Groundwater Monitoring

Project Proponent: Inyo County Water Department

The California Statewide Groundwater Elevation Monitoring Program (CASGEM) was created by as part of the 2009 Comprehensive Water Package (SBX7-6, Groundwater Monitoring). By passing SBX7-6, the Legislature established a statewide program to collect groundwater elevations and make them publically available. SBX7-6 legislation provides that groundwater elevations in all 515 groundwater basins identified in California Department of Water Resources Bulletin 118 will be monitored in a manner sufficient to determine seasonal and long-term trends in groundwater elevation. All or parts of 38 groundwater basins lie within Inyo County. CASGEM provides that certain local entities may assume responsibility for monitoring and reporting groundwater elevations. Eligible monitoring entities include counties. To be considered for designation as a monitoring entity, eligible monitoring entities must notify DWR prior to January 1, 2011. If no prospective monitoring entity comes forward to assume responsibility for a monitoring area, DWR will assume responsibility and eligible monitoring entities with jurisdiction in the monitoring area may lose eligibility for state water grants and loans. Inyo County intends to volunteer as monitoring entity for a number of groundwater basins in the County. This project will assist the County in fulfilling state groundwater monitoring mandates by developing groundwater monitoring plans for basins for which DWR designates Inyo County as the monitoring entity.

Estimated project cost: $45,000

76. Alabama Hills Fire Suppression Evaluation

Project Proponent: Lone Pine Fire Protection District

The Alabama Hill subdivision is a relatively small rural subdivision containing approximately 200 homes on 1/2 to approximately 10 acre parcels. The area was developed and subdivided starting in the 1960s without any fire suppression system (hydrants and mains) requirements enforceable by the County during the initial development of this area. County Code currently requires individual new homes to install a 3,500 gallon tanks with a fire department connection. But, most of the older homes have no fire water storage and many of the newer tanks have been installed in areas that are inaccessible to fire apparatus. The ISO rating (an insurance company rating for fire insurance) for the area is Public Protection Classification 9, on a scale of 1 to 10. This high ISO rating has made fire insurance difficult and expensive to obtain and leaves the area vulnerable to wildland fire because there is not much water available for fire suppression.   The area is classified as a "Moderate" Fire Hazard Severity Zone by Calfire.

The proposed project would include an evaluation and feasibility study of the area with the final goal of installing a system of mains and hydrants for fire suppression only. Individual water wells will continue to provide water for domestic use. A preliminary engineering report would also be prepared as part of the project. This report is usually required by lenders prior to funding a construction project.

The Lone Pine Fire Department has previously met with USDA Rural Development Water and Environmental Programs staff to discuss a Grant/Loan package. USDA has indicated that the proposed project will qualify for funding through their program. But, the fire department does not currently have budget for the preparation of the evaluation and the preliminary engineering report.

Estimated project cost: $50,000

77. Mono County Safe Water Systems Project

Project Proponent: Mono County

There are numerous small water systems in Mono County that are currently in violation of state and federal water quality standards. This is a result of aging infrastructure, archaic system designs, as well as advancing water quality mandates. Most of these systems do not possess the economy of scale to fund such projects, nor do they possess the resources to participate in the grant process afforded by the IRWMP.

Because many of these improvements are of relatively slight costs, ranging from $10,000 to $30,000, it makes the pursuit of grant opportunities very difficult to justify as substantial costs can be accrued in the process of writing of the grant, in some cases rivaling the total grant request. For this reason, Mono County feels it prudent to establish a fund from which eligible expenses can be reimbursed to these systems that correct existing water quality violations.

Eligible expenses will strictly abide Prop 84 Implementation PSP requirements. Only eligible expenses defined by the PSP will be reimbursed, and match requirements will be held at 50% as beneficiaries will be required to submit all eligible receipts for a 50% reimbursement.

The objectives of the project are simple: to trigger improvements to small water systems that may otherwise not occur due to financial reasons, and to offer the funds on a first-come, first-serve basis that would elicit a sense of urgency among eligible participants to address these water quality issues.

The project is designed as a vehicle to aid the systems listed below. These systems have been identified by Mono County Environmental Health as being in violation of water quality standards, or with infrastructure that does not meet current health and safety standards.

The beneficiaries of the project will be the users of the respective water systems, who will also be partners as they perform the contracting and delivery of work that will permit disbursements from the fund.

The following list contains examples of water systems have been identified as potential candidates for these funds:

Sierra East Mobile Home Park (MHP)

Problem: Arsenic. Well under influence of surface water. Not meeting Title 22 requirements.

Objectives: Solve water quality issues

Solution: Arsenic treatment plant RO system, drill new source

Deliverable: one of the above

Beneficiaries: residents of the park

Partners: MHP park, homeowners association

Project Status: Problem identified

Hot Creek Ranch

Problem: Bacteriological issues related to surface water intrusion.

Objectives: **A**address water quality issues

Solution: Isolate spring source, or install treatment system

Deliverable: Treatment system or isolation of source

Beneficiaries: Hot Creek Ranch residents and guests

Partners: Hot Creek Ranch

Project Status: Problem identified

<u>Sierra Business Park (SBP)</u>

Problem: Bacteriological issues related to bad well seal

Objectives: Address water quality issues

Solution: Drill new well or provide treatment

Deliverable: New well or treatment system

Beneficiaries: SBP owners and tenants

Partners: SBP property owners

Project Status: Problem identified, monitoring of bacteriological levels

<u>Virginia Lakes Mutual Water Company</u>

Problem: Bacteriological issues with spring source

Objectives: Address water quality

Solution: Spring retrofit

Deliverable: Spring retrofit

Beneficiaries: Users of system

Partners: Virginia Lakes Mutual Water Company

Project Status: Problem identified

<u>Tioga Pass Resort (TPR)</u>

Problem: Lacking infrastructure for surface water treatment

Objectives: Provide surface water treatment

Solution: System improvements

Deliverable: System improvements

Beneficiaries: Tioga Pass Resort residents and guests

Partners: TPR

Project Status: Problem identified

<u>Viking Voorhis Camp</u>

Problem: Removable well cap, unsecured well, line problems

Objectives: Address infrastructure problems

Solution: Well improvements, pipe replacement

Deliverable: Required improvements

Beneficiaries: Users of camp

Partners: Viking Voorhis Camp

Project Status: Problem identified

<u>McGee Creek Inn</u>

Problem: Potential cross-connection line, well and spring issues

Objectives: Achieve code compliance

Solution: Well cap, infrastructure and line renovation

Deliverable: Same

Beneficiaries: McGee Creek Inn residents/guests

Partners: Owners of McGee Creek Inn, manager

Project Status: Problem identified

<u>Benton Hot Springs</u>

Problem: Lacking storage capacity for use, hot water

Objectives: Solve hot water issues, provide for cooler domestic water

Solution: Increase storage capacity to reduce temps

Deliverable: Same

Beneficiaries: Benton Hot Springs residents and visitors

Partners: Benton Hot Springs

Project Status: Problem identified

Total project cost: $250,000

78. Oak Creek Watershed Fire/Flood Restoration Phase I

Project Proponent: Fort Independence Indian Reservation

The Fort Independence Reservation encompasses 556.02 acres of land located approximately two miles north of Independence, California, in the shadow of the Sierra Nevada range.

In the summer of 2007, the Eastern Sierra sustained a naturally caused wildfire that denuded a large part of the Oak Creek watershed. The banks were bare throughout the winter and just as vegetation was beginning to come back a monsoonal rainstorm struck the crest of the Sierra.

On July 15, 2008, a massive mudflow originating in several forks of Oak Creek came through the reservation and filled in all existing channels on the southwest side of the reservation. It created new channels in the alluvial mud that ignored the previous channels and closed highway 395, due to mud and debris flows. All irrigation diversions were destroyed along with damaged or devastated campgrounds (now closed by NPS), local ranches, homes, and the Tribal RV Park. Spring of 2009 runoff brought more flooding and sediment loading of what was left of the creek and irrigation system. Spring 2010 was wrought with more flooding, creek bank failure and the removal of over 600,000 tons of sand and debris from sediment traps by Los Angeles Department of Water and Power (LADWP).

The tribe proposes to collaboratively restore, add flood protection and recovery, and establish a monitoring and sediment control program with its watershed partners. By meeting these objectives the Tribe will be able to protect the historical Tribal use and public safety.

This is a three-phase project design. Phase One is the study and engineering portion of the project which has begun with a Bureau of Reclamation grant to asses Watershed and Oak Creek irrigation system issues. The Tribe is requesting IRWMP funding to be used for the vast engineering of up to three flood diversions, two reservoirs, three miles of creek restoration, and up to 500 acres of irrigation system as a portion of Phase One.

The beneficiaries of this project will be the Tribe, Oak Creek Stakeholders (private citizens), Inyo National Forest, LADWP, and local flora and fauna.

Total project cost: $355,760

79. LPPSR Hydrant Replacement on Zucco Road

Project Proponent: Lone Pine Paiute-Shoshone Reservation

The fire hydrants located throughout the reservation are in need of replacement. In a report created by SCS Engineers in June of 1999 titled *Water Resources Management Plan and Irrigation Analysis: Lone Pine Paiute-Shoshone Indian Reservation, Lone Pine, California*, it was noted that the majority of hydrants on LPPSR were nearing the end of their service life (based on a 40-60 year service life). Since 1999, none of the hydrants have been replaced; therefore, they are in need of replacement.

The main objective of this project is to replace the existing fire hydrants on Zucco Road with newer, properly functioning, efficient models. Other subsequent objectives are safer conditions on Zucco Road due to improved operational efficiency of hydrants, lower leak potential due to replaced hydrants, fire suppression, and employment of Tribal Members from the LPPSR for completion of the project.

The beneficiaries of this project are both Tribal and non-Tribal residents living on the reservation. The new hydrants on Zucco Road would create a safer area less prone to fire damage, which helps protect homes in and around the surrounding community of Lone Pine. Since the hired help will come from LPPSR, the Tribal Members are given an opportunity for work that otherwise would not have existed.

Total project cost: $42,596

80. Well 5 Project

Project Proponent: Mountain Meadows Mutual Water Company

Currently, the Mountain Meadows Mutual Water Company (”MMMWC”) is under a compliance order from the County of Mono for noncompliance of the uranium maximum compliance level (mcl). In an effort to avoid treatment for uranium removal and the associated long term costs, the MMMWC has identified a potential water source that would allow the Company to comply with the order.

This water source, Well 5, is located on a recently purchased parcel owned by the MMMWC, near the intersection of South Landing and Highway 395 in Mono County. The well has been tested, with uranium levels proving to be undetectable. Testing will continue per State requirements.

Supporting infrastructure must be installed, including power, telemetry, a pump, and mains to connect it to the current water system. In addition, a relay pump must be installed to allow the pumping of water into another pressure zone, to the current storage tanks.

The Company has obtained all necessary governmental approvals for the construction and installation of the infrastructure.

The beneficiaries of the project will be the users of water within the boundaries of the Company, which includes approximately 100 single family residences, three multi-family condominium/ townhome projects, Mono County Road Department, the Crowley Lake Community Center and a church.

Total project cost: $200,000

81. Ultra Low Flush Toilet and Fixtures Change Out Program

Project Proponent: Bishop Paiute Tribe

Sewer treatment capacity has limited the Tribe’s ability to expand its housing base and economic base. Finding a way to maximize the existing treatment capacity until further capacity can be built or purchased has led the Tribe to find creative ways to maximize the existing capacity.

The objectives of this project are to focus on the reduction of domestic water usage and wastewater disposal involving the replacement and repair of leaking and low-efficiency residential and commercial indoor water fixtures. The result of these measures will be to save a minimum of 13,548 gallons per day (15 acre-ft/year) of domestic water - enough for an additional 20 new domestic water connections without increasing domestic water production, or provide an additional 11 acre feet/year to the Tribal Irrigation Program while reducing sewer flows (indoor use) by at least 12,181 gallons per day, (Bishop Paiute Reservation Water Audit and Drip Survey, 2006). This will reduce demands on the wastewater capacity and O&M on the Tribe's water supply system.

This is presently needed as the Tribe is presently periodically exceeding contract flow capacity with an off-reservation wastewater treatment district. The expected life of these improvements is estimated at approximately 20 years. These benefits will occur year-around but will be most useful in the summer months when domestic water use is highest. Estimates of water saved (direct benefits) were obtained by measuring water loss and by direct count of low-efficiency fixtures at 403 water connections via a water audit survey conducted in 2004 (updated in 2005).

The ultimate beneficiaries of this project are the Tribal members who will benefit from having more wastewater capacity to expand their Reservation and lower costs for water and sewer fees as the reduced groundwater pumping and wastewater disposal costs would be decreased for the Tribe. Secondary beneficiaries are the people of the greater Bishop area who will see benefits to groundwater levels from reduced groundwater pumping.

Total project cost: $171,000

82. Drainage Design Manual and Flood Plain Ordinance Update

Project Proponent: Mono County

Mono County currently has no manual or policies for design of temporary or permanent storm drain facilities. While Mono County Flood Plain Regulations are based upon the minimum model ordinance requirement by the Federal Emergency Management Agency (FEMA), they do not take into account risks unique to the topography or soil conditions found in the Eastern Sierra. Nor do they take advantage of opportunities to reduce flood insurance costs through improved protection of insurable structures. It is anticipated that development pressures will continue in Mono County, particularly in areas where potential for growth is higher due to lower construction costs and/or proximity to employment centers. As development continues, it is necessary to provide consistent and thoughtful guidance and regulations related to storm drain infrastructure and development within flood plains.

The primary objective of the developing a Drainage Design Manual and updating the Mono County Flood Plain Regulations is to protect lands, structures, infrastructure and water bodies from degradation or contamination resulting from inadequate design of facilities. These documents are necessary to ensure that new development provides sufficient infrastructure and mitigates the impact of said development. They will provide consistent policy and guidance for determination of required improvements, along with accurate data for selection and design of storm drainage improvements. Having these documents in place with provide opportunities for the use of best management practices for temporary and permanent control and treatment of storm runoff.

The work plan and document structure will be based upon existing drainage studies pertaining to Mono County, along with comparable documents utilized in communities and regions with similar topography, climate and population. This will allow Mono County to build upon the experiences and knowledge of other local governments in managing development. The final product from this project is a Drainage Design Manual that can be utilized during scoping, design and approvals for future developments, along with an update of the Flood Plain Ordinance aimed at reducing risks from flood losses. This project is also seen as an opportunity to educate the local development community and strengthen relationships between the County and developers.

Both the general public and future generations will benefit from this project. By mitigating potential impacts of future development, the environment will also benefit through improved water quality, adequate conveyance system capacity and reduction of erosion. Potentially, this project will provide an opportunity to reduce flood insurance rates through the institution of flood plain regulations that go beyond the minimum model ordinance in reducing risks from flood losses.

Total project costs: $60,000

83. Customer Meter Replacement Program

Project Proponent: Mammoth Community Water District

The District currently meters all water service connections. Using electronic radio units on all meters, the entire service area's meters are read in a single day, once per month. However, there is not funding for periodic replacement of aging meters that are inaccurate or non-functioning. Non-functioning or poorly functioning meters increase effective system water losses and reduce revenues needed to fund operations and maintenance. In addition, non-functioning meters limit the ability of the District to gain important data for tracking water use by customer categories, implement tiered pricing to encourage conservation, and conduct water audits. The District is striving to meet State requirements and implement best management practices to reduce per capita use by 20 percent by the year 2020. This project will provide the initial funds to jump start a customer meter replacement program for the District. This initial program will inspect 200 customer meters and repair or replace as necessary. Determining per capita use, monitoring customer compliance over time, and implementation of water conservation best management practices requires properly functioning customer meters.

This project will:

• Encourage water conservation through tiered pricing incentives already in place
• Decrease water loss to the distribution system
• Assist in recognizing and alerting customers of potential leaks on their property.
• Allow for improved monitoring of landscape irrigation practices and code compliance.
• Improve monitoring and projections used in the District's Urban Water Management Plan (UWMP). The UWMP is used to integrate urban land planning with projected water supplies.
• Identify improperly sized meters that are not accurate under the actual customer use rate.
• Create a plan for an ongoing meter replacement program for the District that will inspect meters for replacement on a 20 year cycle (CUWCC best management practice).

The project will include field inspection of 200 meters for replacement or repair the first year and evaluate the efficacy of the program in terms of reduced water losses and increased billing revenue. The long-term objectives are to incorporate the program as an annual District program. A District rate study planned for 2011 will include the necessary adjustments to rates to support long-term funding for the customer meter inspection program. The District will provide a written report on the program that includes for each inspected meter whether it was repaired or replaced, the type of meter, the customer class served by the meter, the connection size, and whether unaccounted losses were occurring.

Water conservation practices implemented by the District benefit all users and ratepayers by increasing available water supplies during drought years, encouraging conservation through tiered pricing, reducing the need to develop new water supplies, and assisting in meeting the water supply demand for the Town of Mammoth Lakes at buildout. In addition, decreasing water demand reduces energy consumption and chemical use by the District to pump, treat and distribute water and wastewater.

Total project cost: $100,000

84. Water Conservation Program

Project Proponent: Mammoth Community Water District

Water conservation is vitally important to the District because both surface water and groundwater supplies are limited, the Town's General Plan includes additional growth, and the State will require the District to document a 20 percent reduction by 2020. To create an effective program, the District has identified obstacles that must be overcome to reduce customer water demand. These obstacles include lack of incentive to replace old or poorly functioning fixtures in rental and second homes, inability to purchase and install new fixtures, and the presence of old and poorly designed and maintained irrigation systems. In addition, our remote and rural location makes access to workshops and classes on irrigation efficiency difficult to attend. This last obstacle has resulted in a lack of local irrigation auditors. These auditors are required by the State to audit water use for installation of new landscapes to minimize outdoor water demand.

The District would like to implement a three part water conservation program. Part 1 would incentivize replacement and installation of indoor and outdoor water conservation fixtures by offering rebates. Rebate offers would be provided for high efficiency toilets, clothes washers, irrigation materials and weather sensitive irrigation controllers. The District has sporadically offered rebate programs but does not have a dedicated funding source. The District would review past programs for successful elements to be incorporated in this program.

In Part 2, the District would provide irrigation auditing courses for contractors interested in pursuing certification and for property managers interested in reducing water demand. A water management course would also be offered for homeowners and landscapers. This course would focus on retrofitting existing irrigation systems and designing new water efficient landscapes and irrigation systems.

The District would also like to create a highly visible low-water use demonstration landscape as Part 3 of program. The installation of a high quality xeriscape in downtown Mammoth Lakes is timely because the Town is in the process of developing a Downtown Redevelopment Neighborhood Plan that includes new street-side and median landscaping. Design of an attractive low-water use landscape would help establish design criteria for the redevelopment plan. In addition, the landscape would serve as a model of appropriate landscapes for residents and visitors to the Mammoth Lakes area.

Part 1 will be run as an in-house rebate program with applications and pre- and postverification inspections. The District will issue rebate checks to customers that complete the application process. Part 2 would involve contracting with a vendor to teach courses meeting the description above. Courses would not be limited to local contractors or customers. Part 3 would involve a partnership with the Town to landscape a town parcel, select a landscape architect and set landscape design criteria.

Part 1 and 2 would result in long-term indoor and outdoor water demand reductions. Part 2 would also increase the number of available irrigation auditors. Part 3 will result in a model landscape that will inform the Town's development standards during completion of the downtown redevelopment plan and will showcase a landscape appropriate for water challenged residents in California. The District will provide a written report to the IRWMP staff on results of the program.

District customers will benefit from increased water availability and reliability now and as the Town meets buildout projections. In addition, conservation produces a relatively low cost and zero maintenance water supply in comparison with developing new production wells. Other water agencies can utilize our program successes to embark on similar programs and regional benefits can be gained from the knowledge received from the irrigation courses.

Total project cost: $130,000

85. Groundwater and Surface Water Supply Forecasting and Optimization Model

Project Proponent: Mammoth Community Water District

The District uses both local surface water from the Lakes Basin and groundwater from the Mammoth Groundwater Basin. The relative mix of each source varies widely year-to-year based on variability in the watershed snowpack and runoff patterns, as well as the groundwater levels influenced by the snowpack and runoff recharge timing. MCWD has a newly developed MODFLOW groundwater model, which runs on a 90-day time step to simulate well operations and aquifer response. We also have a surface water model which simulates surface water runoff and reservoir (Lake Mary) operations on a daily timestep. The models were developed for separate purposes initially, and are not integrated to allow effective forecasting of supply and optimization of seasonal water supply mix. This reduces the District's ability to forecast and optimize the seasonal supply mix based on yield and operations costs, since groundwater has a unit cost approximate 10 times higher than surface water, due to the large energy demands for pumping.

The objective of the project is to modify and integrate the two models, and link to a third commercial simulation package (GoldSim or other), which can then be used to develop water year supply forecasts based on actual snowpack conditions and options for optimal source mix (maximum reliable supply and minimum operating costs) during the heaviest water demand period from early summer through fall.

The deliverables from this project will include the modified groundwater and surface water models, and the GoldSim software platform user interface. A technical report will be produced to document the models' development, calibration, and guidelines for use. An initial set of model runs, bracketing typical water year conditions from historic hydrology, will be used to validate the reasonableness and accuracy of the forecasts and supply mix optimization.

Total project cost: $250,000

86. Mountain Gate Trailhead Parking and Restroom

Project Proponent: Mono County

Mono County has been developing the Mountain Gate Fishing Access and Mountain Gate River Parkway (Mtn. Gate) since the devastating 1997 Walker River flooding. Funding has primarily come from the County general fund and grants. In addition, this project has been strongly supported by the community of Walker, as evidenced by the work and commitment of the Mountain Gate Working Group, a subcommittee of the Antelope Valley Regional Planning Advisory Committee.

The County has acquired property at the intersection of Eastside Lane and U.S. 395 at the southern edge of the town of Walker. This property is intended to be a parking area and trailhead for a path along the West Walker River providing access to the Mountain Gate Fishing Access, approximately 0.7 miles upstream. Ultimately, Mtn. Gate will include approximately 1.3 miles of river frontage within the majestic West Walker River Canyon. Parking and sanitary facilities are necessary to protect the nearby landscape from abuse and contamination by users of the facility.

The objective of the Mountain Gate Trailhead and Restroom project is provide parking and restroom facilities at the northern terminus of Mtn. Gate. The design will include a small parking area with opportunities for expansion as use of the site increases. Once parking is constructed, several dirt roads currently within the boundaries of Mtn. Gate can be closed and revegetated, eliminating a source of erosion and contamination into the river. Sanitary facilities will include a well, water system, onsite sewage disposal system and restroom structure. All facilities will be designed to meet requirements of the Americans with Disabilities Act and the California accessibility regulations.

This project will result in the design and construction of the Mtn. Gate trailhead parking and restroom facilities, providing a minimum of ten parking spaces and sanitary facilities for those utilizing the West Walker River. Deliverables will include the final design documents and infrastructure on the site.

The 1997 flood through the Walker River Canyon decimated the vegetation and infrastructure present in the canyon. Several segments of U.S. Highway 395 were washed away, along with the Mountain Gate Resort and adjacent homes. As a result, many portions of the West Walker River, particularly within the northern end of the canyon, were armored to protect the adjacent roadway. While serving to protect infrastructure, these actions made access to the river, particularly for the disabled and elderly, extremely difficult. The Mtn. Gate projects are designed to provide access to the river environment for all citizens. Construction of sanitary facilities benefit the environment by providing means for human waste disposal. Providing vehicular parking will enable the County to close several dirt roads in the area which are currently used for direct river access.

Total project cost: $350,000

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Appendix F: Mandatory Plans and Documents

Mandatory plans and documents governing members of the Inyo-Mono RWMG

Document	Region	Acquired (Y/N)	Format	Location/ Source	Description	Date
Assembly Bill 303- Local Groundwater Assistance Program	Indian Wells Valley	Yes			AB 303 Project Plan funded the development of a GIS management system to archive, track, and present groundwater data, develop a conceptual model, and develop a website to allow public access to groundwater data.	2003
Assembly Bill 303- Local Groundwater Assistance Program	Indian Wells Valley				AB 303 Project Plan funded the drilling of eight monitoring wells in the southwestern portion of the Indian Wells Valley. Over 70 sites (surface and groundwater) were sampled for interpretation of general mineral/physical characteristics, inorganic chemicals, and various isotopes.	2006
Bishop Creek Watershed Management Plan	Bishop Creek	No			In preparation	2010
Bishop Paiute Tribe Water Quality Control Plan	Bishop Paiute Tribe	Yes	Digital	http://www.bishoptribeemo.com/Water/PDF/WQS-revision_6%20final.pdf	The Bishop Paiute Tribe Water Quality Plan contains a characterization of the Reservation, its climate, geology, surface and ground waters. The plan identifies water quality and quantity issues and describes water quality standards. Includes a discussion of general control actions and recommendations to protect water resources for municipal, industrial and cultural uses as well as to protect wildlife and aquatic habitat.	2007
BLM Bishop Field Office Resource Management Plan Record of Decision (ROD)	Bishop Resource Area	Yes	Digital	See folder	Decision of the Bureau of Land Management for managing federal mineral leases and BLM public lands within the Bishop Resource Area. Decisions and strategies are presented for recreation use, wildlife management, mineral uses and land ownership and authorizations.	1993
City of Los Angeles DWP Urban Water	Los Angeles,	No			Water supply agencies in California are mandated to prepare an Urban Water Management Plan	2000, 2003,

Document	Region	Acquired (Y/N)	Format	Location/ Source	Description	Date
Management Plan and 2003-4 Update	Inyo County, Owens Valley				(UWMP) to describe efforts to manage water supply and demand every five years. The LADWP 2000 UWMP details the management of multiple water supply sources to meet the needs of Los Angeles including contingencies for drought. Water deliveries from the Owens Valley are discussed extensively in the UWMP, including impact assessments on the City's water supply of projects to fulfill the Agreement and MOU provisions. In addition, the UWMP details water conservation, recycling and other strategies and projects to manage water demand and promote efficient consumer water use. Strategies described in the UWMP to manage local and imported water supplies and demand in Los Angeles directly influence management of lands and water resources supplying the LAA by providing greater flexibility to meet environmental responsibilities in the Owens Valley while continuing to meet demands within Los Angeles.	2004
Conservation Strategy for the Southwestern Willow Flycatcher	Inyo and Mono counties			LADWP	Includes conservation strategies for the Southwestern Willow Flycatcher in proposed critical habitat, which includes riparian habitat along a 69-mile reach of the Owens River and a 0.9 mile long reach of Rock Creek in Inyo and Mono counties.	2005
Devils Postpile General Management Plan	Devils Postpile National Monument	Yes		http://www.nps.gov/depo/parknews/index.htm	Scoping and preliminary alternatives have been completed. Draft Affected Environment is in development.	
DRAFT Owens Valley Land Management Plan	Owens Valley	No	Digital	LADWP	Provides management direction for water supply, habitat, recreation, and land use on all City of Los Angeles-owned lands in Inyo County, excluding the Lower Owens River Project area. This plan provides a framework for implementing management prescriptions through time, monitoring resources, and adaptively managing changed land and water conditions.	2008

Document	Region	Acquired (Y/N)	Format	Location/ Source	Description	Date
FINAL 2008 Owens Valley PM 10 Planning Area Demonstration of Attainment State Implementation Plan (SIP)	Owens Lake Dust Control Project		Digital	http://www.gbuapcd.org/	Calls for additional 15.1 square miles of Dust Control Measures on Owens Lake, including shallow flood and moat and row. (This 15.1 square mile requirement is in addition to the 29.8 square miles already in operation.)	2008
Final Subsequent Environmental Impact Report	Owens Lake Dust Control Project		Digital	http://www.gbuapcd.org/	This Subsequent Environmental Impact Report (EIR) analyzes the potential for significant environmental impacts in association with the 2008 Owens Valley PM10 Planning Area Demonstration of Attainment State Implementation Plan (SIP)1 (proposed project). This Subsequent EIR incorporates the 1998 EIR and 2003 EIR by reference and provides broad program-level and project-specific environmental analyses for the 2008 SIP revision.	2008
Final Yellow Billed Cuckoo Enhancement Plans	Baker and Hogback Creeks, Inyo County			Ecosystem Sciences	The 1997 MOU between LADWP and Inyo County and others required that habitat be evaluated in the riparian woodland areas of Hogback and Baker creeks so that enhancement plans could be developed. These plans identify reasonable and feasible actions or projects to maintain and improve the habitat of the Yellow-billed Cuckoo.	2005
Green Book for the Long-term Groundwater Management Plan for the Owens Valley and Inyo County	Inyo County	Yes	Digital	http://www.inyowater.org/Water_Resources/Green%20Book%202000.PDF	This Green Book was created in agreement between the County of Inyo and LADWP for the Long-term Groundwater Management Plan for the Owens Valley and to accompany the environmental impact report (EIR). The Green book describes goals of the Agreement that pertain to vegetation management and sets forth procedures and methods to achieve those goals. It describes techniques, procedures and criteria to compile vegetation inventories, create vegetation management maps and monitor vegetation data. Further studies and supporting technical vegetation information are presented.	1990

Document	Region	Acquired (Y/N)	Format	Location/ Source	Description	Date
Groundwater Management Plan for the Mammoth Basin Watershed	Mammoth Community	Yes	Digital	http://www.mcwd.dst.ca.us/ProjectsReports/GWMP/GWMP.htm	This plan presents a management strategy to guide management decisions and evaluate water resources within the Mammoth Basin watershed. The objectives of this report are to protect the environment, establish sustainable yields and meet the needs of the community. The plan outlines current basin conditions and groundwater monitoring programs based on existing reports and data. The plan presents specific action recommendations for groundwater protection and management.	2005
Habitat Conservation Plan for the Owens Valley	LADWP owned lands in Owens Valley	No		LADWP	Not yet available	2009/2010
Hydrologic Assessment of the Dry Creek Drainage for Mammoth Mountain Ski Area	Mammoth Mountain Ski Area	No	-	-	Available for public review in 2009	2008
Indian Wells Valley Cooperative Groundwater Management Plan	Indian Wells Valley	Yes	Digital	http://www.iwvgroundwater.org/default.html	The Cooperative Groundwater Management Plan was signed and approved in 1995, as the first step towards determining best management practices of groundwater resources in Indian Wells Valley. Funding was used to monitor wells used for groundwater; develop a GIS management system to archive, track and present data; develop a conceptual groundwater model; and to develop a website to allow public access to information. Based on above report, data gaps were identified. This plan proposes additional tasks: environmental documentation, construct monitoring wells, water sampling, continuous water level monitoring and geohydrologic data review.	2008
Inyo County General Plan Update	Inyo County	No			The Inyo County General Plan sets out the goals and policies of the County and provides for implementation measures to ensure the policies are carried out. Policies have been established to support the implementation of the Agreement and	2001

Document	Region	Acquired (Y/N)	Format	Location/ Source	Description	Date
					MOU and to manage groundwater resources in the County to provide for a viable economy, enhance the natural environment, and protect water quality and quantity through ordinance, project approvals, and agreements with other agencies.	
Inyo County Groundwater Ordinance	Inyo County	Yes	Digital	http://www.inyowater.org/water_resources/Inyo_County_Ordinance_1004.pdf	Establishes policy for the County of Inyo to manage the transport, transfer, acquisition and sale of surface and groundwater to protect the overall economy and environment of the County.	1998
Inyo County Resolution No. 99-43 re: Extraction and Use of Inyo County's water resources	Inyo County	Yes	Digital	http://www.inyowater.org/Water_Resources/IC%20Res%2099-43%20Water%20Policies-Adopted%207-27-99.doc	A resolution of the Inyo County Board of Supervisors which affirms the extraction and use of Inyo County's water resources for the Lower Owens River Project in order to meet the obligations under the Inyo/Los Angeles Long Term Water Agreement, Final EIR, and Memorandum of Understanding., while protecting the County's environment, citizens and economy from adverse effects. This document establishes policies and procedures to implement the obligations of the County and evaluate results.	1999
Inyo-Los Angeles Long Term Groundwater Management Plan for Owens Valley and Inyo County and 1991 EIR	Owens Valley, Inyo County	Yes	Digital	http://www.inyowater.org/Water_Resources/water_agreement/default.html	The overall goal of the Agreement is to manage water resources in the Owens Valley to avoid causing certain described decreases in vegetation and to avoid significant effects on the environment which cannot be mitigated while providing a reliable supply for use in Inyo County and for export to Los Angeles. Conditions documented during a vegetation inventory conducted from 1984-87 serve as the basis for determining whether significant decreases and changes in vegetation have occurred. Inyo County and Los Angeles jointly prepared an EIR analyzing impacts of management according to the Agreement on the	1991

Document	Region	Acquired (Y/N)	Format	Location/ Source	Description	Date
					Owens Valley environment and water supply for Los Angeles. The Agreement established detailed procedures contained in the Green Book to manage groundwater pumping, to monitor environmental conditions, and to assess and mitigate impacts of increased water export to Los Angeles. A detailed summary of the history leading to adoption of the Agreement is contained in the EIR (pp. 2-10 to 2-19).	
Inyo National Forest Land and Resource Management Plan	Inyo National Forest	Yes	Digital	http://www.fs.fed.us/r5/inyo/projects/1988-plan.shtml	This Plan provides direction for the management of all lands and resources administered by the Inyo National Forest and documents the environmental analyses conducted as part of the planning process. Describes current conditions and need for management actions. The plan lists alternatives and proposed actions, describes affected environment and environmental consequences.	1988
June Lake 2010 Area Plan	Mono County	Yes	Digital	http://www.monocounty.ca.gov/cdd%20site/Planning/JLKAreaPlan.htm	The June Lake 2010 Area Plan summarizes existing conditions in the June Lake area, identifies community issues and potentials, and specifies goals, objectives and policies to guide community development over the next 20 years. This Area Plan supplements the Mono County General Plan by providing area-specific directives.	1991
June Lake PUD Master Water Plan Update	June Lake Area	Yes	Digital	See folder	The document describes present/projected land and water use in the June Lake District and proposes future improvements needed to meet future demands along with estimated capital costs. Estimates of future water usage are based on the land use projections.	2007
Kern County Groundwater Ordinance	Kern County	Yes	Digital		Establishes county policy regarding transfers or transport of native groundwater to areas outside Kern County and the watershed of the aquifer.	1998
Lower Owens River Project (LORP) Final EIR	Owens Valley/ Inyo County	Yes	Digital	See folder	This final EIR was prepared by the LADWP as part of the agreement to restore various wetland and riparian habitats along the Owens River, known as the Lower Owens River Project (LORP). The	2004

Document	Region	Acquired (Y/N)	Format	Location/ Source	Description	Date
					objective of the EIR is to evaluate the impacts of the proposed LORP in order to allow LADWP and the County to make informed decisions about the final design and implementation of the Project and to implement the LORP in the most environmentally sound manner. A description of the project, current environmental conditions, potential impacts of the project, and alternatives are presented.	
LORP Action Plan (Appendix to MOU between Inyo County, LADWP and others re: implementation of the LORP)	Owens Valley/ Inyo County	Yes	Digital	http://www.inyowater.org/LORP/default.htm	This plan describes the tasks and objectives for preparing an ecosystem management plan, which will guide the implementation of the Lower Owens River Project (LORP), as part of the Inyo/Los Angeles Water Agreement to restore wetland and riparian habitats and to rewater the full 60-mile reach of the Lower Owens River.	1997
LORP Ecosystem Management Plan	Owens Valley/ Inyo County	Yes			See above.	2002
LORP Monitoring, Adaptive Management , and Reporting Plan	Owens Valley/ Inyo County	Yes	Digital	Ecosystem Sciences	Describes the long-term monitoring plan for collecting and analyzing data on the progress toward meeting LORP goals. Using this data, the LORP will be adaptively managed and project management will be modified if data from ongoing monitoring and analysis reveal that such modification is necessary to ensure the attainment of the LORP goals.	2008
Mammoth Community Water District Urban Water Management Plan	Mammoth Community	Yes	Digital	http://www.mcwd.dst.ca.us/ProjectsReports/UWMP/UWMP2005.pdf	This Urban Water Management Plan for the Mammoth Community describes current conditions such as population density, climate, land use and existing sources of water. The plan identifies potential sources of water, future water supply needs, availability and reliability as well as contingency plans for shortages.	2005
Mammoth Mountain Ski Area Master Development Plan	Mammoth Mountain	No	In revision	-	-	2008

Document	Region	Acquired (Y/N)	Format	Location/ Source	Description	Date
Mammoth General Plan Update	Mammoth	Yes	Digital		Strategic plan that establishes guidelines and priorities for the community of Mammoth Lakes. It addresses: land use, circulation, housing, conservation, open space, noise, and safety.	2006
Mill Creek Settlement Agreement (FERC relicensing) P-1390-040	Mill Creek	Various documents	Digital	http://elibrary.ferc.gov/idmws/search/results.asp	FERC issued a new license to Southern California Edison Company for continued operation and maintenance of its 3-megawatt Lundy Hydroelectric Project. The project is located on Mill Creek in Mono County, California. Portions of the project occupy lands managed by the USDA Forest Service and the Bureau of Land Management.	2005 - 2007
Mono County General Plan	Mono County	Yes	Digital	http://www.monocounty.ca.gov/services.html	A long-term comprehensive general plan to guide decisions on future growth, development, and conservation of natural resources for Mono County until 2010. This Plan has authority and established policies are upheld by law. The Plan has a section for land use, circulation, housing, conservation, safety, noise, and hazardous waste management. The County's Regional Planning Advisory Committees (RPACs) and community planning groups reviewed drafts of the general plan; their comments were incorporated into a revised draft.	1997
Mono County Master Environmental Assessment	Mono County	Yes	Digital	http://www.monocounty.ca.gov/services.html	The Mono Country MEA was originally prepared to provide the background environmental information for the update of the Mono County General Plan in 2003. The Mono Country MEA contains information on existing conditions in the county and analyzes the effects those conditions will have on future development. The plan describes in detail existing land use, socioeconomics, community services, demographics, housing, transportation, outdoor recreation, visual resources, cultural resources, climate, air quality, geology, hydrology, biological resources, energy resources, noise, natural hazards, and public health and safety within Mono County.	2001

Document	Region	Acquired (Y/N)	Format	Location/ Source	Description	Date
Mono Basin Watershed Management Plan (Mono County)	Mono Basin	Yes	Digital	http://www.monocounty.ca.gov/cdd%20site/Planning/Projects/Documents/MonoBasinWatershedManagmentPlan307_000.pdf	This plan creates linkages between water quality and water quantity problems and conditions, processes, and activities occurring in the Mono Basin watershed. The study area includes 800 square miles of the Mono Basin watershed; the plan pertains only to lands in the Basin and not Mono Lake. It contains goals and objectives, describes desired future conditions and potential actions, and identifies data gaps. Issues described include water supply (for the June Lake area) and water quality. The guiding principle is to minimize disturbance to stream systems and riparian areas. The plan has no authority itself, and must be adopted by the Mono County Collaborative Planning Team and its member agencies in order to achieve the projects/actions proposed.	2007
MOU between Inyo County, City of Los Angeles, Sierra Club, Owens Valley Committee, CA Dept. of Fish and Game and California State Lands Commission	Owens Valley, Inyo County	No			The MOU resolved disagreements on the scope and details of several environmental projects and studies described in the Agreement, and required additional land and habitat management plans be developed. The majority of the MOU provisions pertain to the implementation of the Lower Owens River Project (LORP) to re-water 53 62 miles of the original channel below the LAA intake dam. This project will establish a viable warm water fishery and healthy functioning ecosystem and wetlands associated with the river. This It is the single largest mitigation project in required by the Agreement. The MOU also establishes a commitment for frequent communication among representatives of the parties to discuss issues that arise during implementation of the MOU and sets out dispute resolution procedures to settle future disagreements.	1997
North Mono Basin Watershed Analysis (Inyo National Forest)	N. Mono Basin	Yes	Digital	http://www.monobasinresearch.org/onlinerep	Analysis conducted during 2001 as part of the Sierra Nevada Forest Plan amendment "…to maintain or restore ecological sustainability to provide a sustainable flow of uses, values,	2001

Document	Region	Acquired (Y/N)	Format	Location/ Source	Description	Date
				orts/	products and services from these lands". Document provides a framework to guide landscape management. Contains a characterization of the watershed, identifies issues and key questions, assesses current conditions, historical and "natural" conditions, interprets data, and suggests management opportunities and recommendations. Issues identified: 1) Human use to the aquatic environment, 2) Human use of the terrestrial environment, 3) Erosion and water quality, 4) Habitat composition (upland, wetland, riparian), 5) Fisheries and fish habitat condition, and 6) wildlife (terrestrial and avian).	
Owens Basin Wetland and Aquatic Species Recovery Plan- Inyo and Mono Counties	Owens Basin	Yes	Digital	USFWS	Establishes recovery objectives for the Owens pupfish, Owens tui chub, and *Astragalus lentiginosus var. piscinensis* and identifies actions needed to protect species of concern in the Owens Basin. The goal is to restore target species to viable and interacting populations within their ecosystems. Includes an implementation schedule to achieve these recovery objectives.	1998
Owens Valley PM10 Planning Area Demonstration of Attainment State Implementation Plan - 2003 Revision	Owens Lake Dust Control Project			Great Basin Unified Air Pollution Control District	Calls for completion of 13.3 square miles of dust control on Owens Lake, bringing a total of 29.8 square miles of dust control measures into operation on Owens Lake. Dust control measures used under this plan include managed vegetation, shallow flood, and gravel cover.	2003
2003 Owens Valley PM10 Planning Area Final Integrated Environmental Impact Report	Owens Lake Dust Control Project			Great Basin Unified Air Pollution Control District	This Final Integrated Environmental Impact Report (EIR) analyzes the potential for significant environmental impacts in association with the 2003 Owens Valley PM10 Planning Area Demonstration of Attainment State Implementation Plan (SIP) (proposed project). This EIR incorporates the 1998 EIR by reference and provides broad program-level and project-specific environmental analyses for the 2003 SIP revision.	2003

Document	Region	Acquired (Y/N)	Format	Location/ Source	Description	Date
Owens Valley PM10 Planning Area Demonstration of Attainment State Implementation Plan	Owens Lake Dust Control Project			Great Basin Unified Air Pollution Control District	Calls for completion of 16.5 square miles of dust control on Owens Lake, including managed vegetation, shallow flood, and gravel cover dust control measures for compliance with National Ambient Air Quality Standards for particulate matter.	1998
Owens Valley PM10 Planning Area Demonstration of Attainment State Implementation Plan Final Environmental Impact Report	Owens Lake Dust Control Project			Great Basin Unified Air Pollution Control District	This Final Integrated Environmental Impact Report (EIR) analyzes the potential for significant environmental impacts in association with the 1998 Owens Valley PM10 Planning Area Demonstration of Attainment State Implementation Plan (SIP) (proposed project).	1998
Proposition 13- Southwest Wellfield Recharge Feasibility Study (2005)	Indian Wells Valley				The Indian Wells Valley Water District constructed two one-acre percolation/recharge ponds, two 6-inch monitoring wells, and assembled a weather station. 527 acre-feet of water were pumped into the recharge ponds while transducers in the monitoring wells tracked water levels. The weather station recorded wind speed, atmospheric temperature, and rainfall. An evaporation pan was used to estimate the on-site evaporation rate.	
Proposition 50- Testing of Zero-Liquid Discharge Technologies Using Brackish Groundwater for Inland Desert Communities	Indian Wells Valley				The Indian Wells Valley Water District completed a comprehensive feasibility investigation to desalt water from the Water District's Northwest Well Field (NWWF). The Water District then applied for a Proposition 50 Grant and was selected to proceed with pilot testing of the major components of the selected treatment train. When fully-implemented, the NWWF brackish water treatment project creates a new source of potable water, furthers the use of economically and environmentally acceptable desalination, advances the desalination technology and evaluates a novel reversible reverse-osmosis treatment plant configuration.	

Document	Region	Acquired (Y/N)	Format	Location/ Source	Description	Date
Senate Billx7-6	Statewide	Yes	Digital	http://www.leginfo.ca.gov/pub/09-10/bill/sen/sb_0001-0050/sbx7_6_bill_20091106_chaptered.html	On November 4, 2009 the State Legislature amended the Water Code with SBx7-6, which mandates a statewide groundwater elevation monitoring program to track seasonal and long-term trends in groundwater elevations in California's groundwater basins. To achieve that goal, the amendment requires collaboration between local monitoring entities and Department of Water Resources (DWR) to collect groundwater elevation data. Collection and evaluation of such data on a statewide scale is an important fundamental step toward improving management of California's groundwater resources.	2009
Sierra Nevada Forest Plan Amendment	Sierra Nevada	Yes	Digital	http://www.fs.fed.us/r5/snfpa/final-seis/	Amendment to the January 2001 Sierra Nevada Forest Plan. Plan adopts integrated strategy for vegetation management to reduce risk of wildfire to communities and to protect old forests, wildlife habitats and watersheds. Includes specific management strategies, actions and requirements to manage forest lands.	2004
State Water Board Restoration Orders 98-07		Yes	Digital	http://www.monobasinresearch.org/legal/index.html	Order amending provisions of order WR 98-05 applicable to stream restoration measures and dismissing petitions for reconsideration. November 19, 1998. State of California Water Resources Control Board. In the Matter of Stream and Waterfowl Habitat Restoration Plans and Grant Lake Operations and Management Plan Submitted by the Los Angeles Department of Water and Power Pursuant to the Requirements of Water Right Decision 1631 (Water Right Licenses 10191 and 10192, Applications 8042 and 8043).	1998
Upper Owens River Watershed Management Plan (Mono County)	Upper Owens River	Yes	Digital	http://www.monocounty.ca.gov/cdd%20site/Planning/Projects/Documents/Upp	This plan creates linkages between water quality and water quantity problems and conditions, processes, and activities occurring in the Upper Owens River watershed. The study area is the 380 square mile Long Valley Hydrologic Area. It contains goals and objectives, and describes desired future conditions and potential actions.	2007

Document	Region	Acquired (Y/N)	Format	Location/ Source	Description	Date
				erOwensWatershedManagementPlan307draft_000.pdf	Issues include water supply and water quality. It identifies data gaps including water quality data, sediment budgets of Mammoth and Hot creeks, and groundwater systems. The guiding principle is to minimize disturbance to stream systems and riparian areas. The plan has no authority itself, and must be adopted by the Mono County Collaborative Planning Team and its member agencies in order to achieve the projects/actions proposed.	
Water Quality Control Plan for the Lahontan Region (Basin Plan)				http://www.swrcb.ca.gov/lahontan/water_issues/programs/basin_plan/references.shtml	The California Regional Water Quality Control Board adopts and implements this Basin Plan for the Lahontan Region, which extends from the Oregon border to the northern Mojave Desert and includes all of California east of the Sierra Nevada crest. This plan sets forth water quality standards for the surface and ground waters in the region, identifies general types of water quality problems, identifies required or recommended control measures for these problems, and summarizes applicable provisions of separate State/Regional Board planning and policy documents and other water quality management plans. This Plan also summarizes past and present water quality monitoring programs and identifies monitoring activities to provide the basis for future Basin Plan updates.	1995
Water Quality Standards, Big Pine Reservation	Big Pine Paiute Tribe of the Owens Valley	Yes	Digital	http://www.epa.gov/waterscience/standards/wqslibrary/tribes/bigpine-200601.pdf	Plan outlines water quality standards within the boundaries of the Big Pine Paiute Reservation to protect public heath and welfare and to maintain or enhance water quality in relation to existing and/or potential beneficial uses of the water. Water quality standards are presented in numerical and narrative form. Describes current water uses and policies for implementation.	2005

Document	Region	Acquired (Y/N)	Format	Location/ Source	Description	Date
West Walker River Watershed Management Plan (Mono County)	West Walker River	Yes	Digital	http://www.monocounty.ca.gov/cdd%20site/Planning/Projects/Documents/WestWalkerWatershedManagementPlan30_000.pdf	This plan creates linkages between water quality and water quantity problems and conditions, processes, and activities occurring in the West Walker River watershed. The study area is the 410 square mile watershed that includes the area above Topaz Reservoir at the California/Nevada border. It contains goals and objectives, describes desired future conditions and potential actions, and identifies data gaps. Issues described include water supply/water allocation and water quality. The guiding principle is to minimize disturbance to stream systems and riparian areas. The plan has no authority itself, and must be adopted by the Mono County Collaborative Planning Team and its member agencies in order to achieve the projects/actions proposed.	2007

Appendix G: CFCC Funding Mechanisms

California Financing Coordinating Committee Water Programs Funding Mechanisms

Program	**Department**	Type	Purpose	**Eligibility** Requirements	**CEQA/ NEPA**	Eligible Uses	**Ineligible Uses**	**Funding Limits**	Terms/Dates	**Contact**
Infrastructure State Revolving Fund (ISRF) Program http://ibank.ca.gov/infrastructure_loans.htm	California Infrastructure and Economic Development Bank (I-Bank)	Loan	Provide financing for construction and/or repair of publicly owned water supply, treatment and distribution systems, and drainage, and flood control facilities	Applicant must be a local municipal entity. Project must meet tax-exempt financing criteria. Project must promote economic development and attracts, creates, and sustains long-term employment opportunities.	CEQA	Acquire land, construct and/or repair water collection and treatment systems, including equipment	Privately owned infrastructure Debt refinancing	$10 million maximum per project per fiscal year $20 million annual maximum per jurisdiction per fiscal year	Interest rate is 67% of Thompson's Municipal Market Index for 'A' rated security Maximum 30 year term Open application process Preliminary Application available at ibank.ca.gov	Diane Cummings (916) 324-4805
Proposition 84 Chapter 2 Public Resources Code Section 75022	California Department of Public Health	Grants	Grants for small community drinking water system infrastructure improvements and related actions to meet chemical and nitrate drinking water standards.	Must be a small community water system with a population less than 10,000 or a public school; priority given to disadvantaged communities; must be in noncompliance with a primary standard or treat surface water and be under a boil water order	CEQA	Please call or check CDPH website for more information. **http://www.cdph.ca.gov/certlic/drinkingwater/ Pages/DWPfunding.aspx**		$5 million per project $500,000 for feasibility study	Pre-application Invited annually	Jose Alarcon (916) 449-5685
Safe Drinking Water State Revolving Fund (SDWSRF)	California Department of Public Health	Loans Grants	Provide low interest loans or grants to assist public water systems in achieving or maintaining compliance with the Safe Drinking Water Act (SDWA)	Must be a public water system Project must be needed to comply with the SDWA Project must be on	CEQA Some projects CEQA/ NEPA	Water treatment facilities, replace aging infrastructure, planning studies, consolidation of water systems, source water protection, etc	Dams or rehab of dams, O&M costs, lab fees for monitoring, projects mainly for fire protection or future growth, etc	$500,000 per planning study $20 million per project and $30 million per entity per cap grant	Pre-application Invited annually Loan: Interest rate is ½ the general obligation rate	Kelvin Yamada (916) 449-5624

Program	**Department**	Type	Purpose	**Eligibility** Requirements	**CEQA/ NEPA**	Eligible Uses	**Ineligible Uses**	**Funding Limits**	Terms/Dates	**Contact**
				CDPH's project priority list System must meet technical, managerial, and financial requirements All applications are for loans; financial review determines if grant funds apply				Call program for grant limitations	2009 program rate is 2.5017%, paid back over 20 years. The rate changes every January Disadvantaged system can obtain a zero interest loan Disadvantaged public and mutual systems may receive partial grant funding	
Community Development Block Grant (CDBG) Program	State Department of Housing and Community Development	Grants to City and County Jurisdictions	Project must principally benefit low income persons/households. For example: do water system upgrades for residents of communities with over half of its residents being low income or extend water service to a site for a business that creates jobs for low income persons	Cities or counties that are not under HUD's CDBG entitlement program Jurisdictions can pay for improvements to their own system or give the funds to private or public water providers	NEPA/ CEQA	Pay for project feasibility study, final plans and specs, site acquisition and construction, and grant administration costs Pay for one time assessment fees for low income families Pay for installation of private laterals and hook up fees for low income families	Maintenance costs Refinancing of existing debt	Each CDBG Allocation sets funding award limits In their annual NOFA (Typically $500,000) Six Allocations: 1-General,2-Native American, 3-Colonia, 4-Economic Development Enterprise Fund, 5-Economic Development Over The Counter, and 6-Planning and Technical Assistance	Notices of Funding Availability (NOFAs) released each year Jurisdiction sets type of financing and terms (grants vs. loans)	Patrick Talbott (916) 552-9361

Program	Department	Type	Purpose	Eligibility Requirements	CEQA/ NEPA	Eligible Uses	Ineligible Uses	Funding Limits	Terms/Dates	Contact
Water and Waste Disposal program	USDA Rural Development	Loan/ Grant	Provide loans and grants to develop and rehabilitate community water systems	Public bodies, Tribes, Nonprofits ,Cities, Towns and census designated places with populations less than 10,000	NEPA/ CEQA	Funds may be used for costs associated with planning,design,and construction of new or existing systems Eligible projects include storage, distribution, source development	Facilities not modest in size, design, and cost For profit systems	None, but average project size is $3-5 million	Loans: 4% - 5% fixed, 40 years Grant funding available to reduce user costs Continuous filing	Dave Hartwell USDA State Office (530) 792-5817
Water and Waste Disposal	USDA Rural Development	USDA guarantees loans made by banks	Provide additional security for commercial lenders that finance community water, systems	Banks and other commercial lenders are eligible applicants Cities, Towns, Public bodies ,census designated place, with populations less than 10,000	NEPA/ CEQA	Funds may be for costs associated with Planning, design, and construction of new or existing systems Eligible projects include water, storage, distribution, and source development	Facilities not modest in size, design, and cost Privately owned infrastructure	None	Negotiated between business and lender Fixed and variable rates allowed Continuous filing	Dave Hartwell USDA State Office (530) 792-5817
Proposition 82 New Local Water Supply	Department of Water Resources	Loan	Water supply development projects and feasibility studies	Local public agencies	CEQA	Construction or study of canals, dams, reservoirs, desalination facilities, groundwater extraction project where more than 50% of expected benefits result from hydroelectric power generation facilities, or other construction or improvements	A	$5 million per eligible construction project $500,000 per eligible feasibility study	Interest rate is the State's rate on General Obligation bonds Repayment up to 20 years for construction projects or 5 years for feasibility studies Continuous filing Check website (www.grantsloans.water.ca.gov) for updates	Jerry Snow (916) 651-9264

Program	**Department**	Type	Purpose	**Eligibility** Requirements	**CEQA/ NEPA**	Eligible Uses	**Ineligible Uses**	**Funding Limits**	Terms/Dates	**Contact**
Proposition 204 Drainage Reuse Program	Department of Water Resources	Grant	Drainage reuse studies	Public agencies	CEQA	Research and technical study projects to develop methods to reuse subsurface agricultural drainage water		$200,000 per project	**This program has been suspended** Check website (www.grantsloans.water.ca.gov) for updated status	Jose Faria (559) 230-3339
Proposition 13 Agricultural Water Conservation Program	Department of Water Resources	Loan	To finance feasible, cost effective agricultural water conservation projects or agricultural programs to improve water use efficiency and to finance feasibility studies for such projects	Local public agencies or incorporated mutual water companies	CEQA	Construction or other capital outlays, including but not limited to canal or ditch piping or lining projects, automating canal structures, water distribution system control improvements, tailwater recovery projects, purchasing and installing water measurement devices, and replacement of leaking distribution system components	General purpose equipment, equipment or materials for operations and maintenance, wellhead rehabilitation, expanded tank storage, water supply, water treatment, water recycling, wastewater treatment, flood control, conjunctive use, and groundwater banking projects	$5 million cap per eligible project	Interest rate is ½ the State's rate on the most recent sale of general obligation bonds Repayment up to 20 years Continuous filing Check website (www.owue.water.ca.gov/finance/index.cfm) for updates	Baryohay Davidoff (916) 651-9666
Proposition 50 (Chapter 7(g)) Water Use Efficiency Program	CALFED / Department of Water Resources	Grant	Projects to improve agricultural water use efficiency (WUE)	Local agencies; nonprofits; tribes; State educational institutions; cities, counties, or other political subdivisions of the State	CEQA	Agricultural water use efficiency implementation projects or studies that carry out the CALFED Water Use Efficiency Program	Wellhead rehabilitation, new storage tanks providing expanded capacity, water supply development, water treatment, wastewater treatment, flood control, conjunctive use, recycled water, groundwater banking projects, among others	Up to $3 million for Section A projects and up to $200,000 for Section B projects Section A – non-State cost share required; disadvantaged communities may qualify for a cost share reduction or waiver Section B – a local cost share is not required	2009/10 Proposal Solicitation Package is under development The total amount available for this funding cycle is $19 million Check website (http://www.owue.water.ca.gov/finance/index.cfm) for updated information on the next funding cycle	Baryohay Davidoff (916) 651-9666

Program	**Department**	Type	Purpose	**Eligibility** Requirements	**CEQA/ NEPA**	Eligible Uses	**Ineligible Uses**	**Funding Limits**	Terms/Dates	**Contact**
Proposition 84 (Chapter 2, §75026) Integrated Regional Water Management (IRWM)	Department of Water Resources	Grant	For projects that assist local public agencies to meet long-term water management needs of the State, including the delivery of safe drinking water, flood risk reduction, and protection of water quality and the environment Grant funds for development and revisions of IRWM Plans and implementation projects of IRWM Plans	A local public agency or nonprofit **representing an IRWM effort must be the applicant or grantee** Other IRWM partners may access funds through their own agreements with the applicant/grantee	CEQA	Development or revision of IRWM Plans. Projects that implement IRWM Plans	Operation and maintenance activities	Bond funding allocation for entire program is $1billion Prop 84 allots grant funding to 11 funding areas. Approximately 20 million in Funds for inter-regional efforts Guidelines contain information on how potential funding of multiple IRWM efforts within a funding area will occur and maximum grant amount per funding area. Guidelines have also been combined with Prop 1E SWFM funding Each Proposal Solicitation Package will have predetermined amount of funds available.	$100 million of implementation will be available in the first Proposal Solicitation Package. Additional $250 million for reducing dependence on delta water may be added to the first round solicitation. Anticipate draft guidelines and application Feb/Mar 2010 25% minimum cost share with waivers for DACs Check website (www.grantsloans.water.ca.gov/grants/irwm/integregio.cfm) for updated status	Joe Yun (916) 653-9222
Proposition 84 Delta and San Joaquin and Sacramento Rivers Water Quality Grant Program	Department of Water Resources	Grant	Water quality improvement projects	Local agencies	CEQA	Projects which result in improvements to water quality in the Delta and San Joaquin and Sacramento River Basins that protect drinking water supplies	Projects that do not show direct protection of drinking water supplies	$4 million to $30 million, depending on geographic location and project type	**This program has been suspended** Check website (http://baydeltaoffice.water.ca.gov/sdb/prop84/index_prop84.cfm) for updated status	Genevieve Schrader (916) 653-2118

Program	**Department**	Type	Purpose	**Eligibility** Requirements	**CEQA/ NEPA**	Eligible Uses	**Ineligible Uses**	**Funding Limits**	Terms/Dates	**Contact**
Proposition 84 Local Levee Assistance Program	Department of Water Resources	Grant	Local Levee Evaluation Projects (LOLE) - Evaluate levee stability and levee seepage and underseepage; Local Levee Urgent Repair Projects (LLUR) - Repair and improve critically damaged local levees.	Local public agencies Levees located outside of the Delta Levees that are not part of the State Plan of Flood Control.	CEQA	LOLE - Evaluation of levee stability, seepage, or underseepage for local levees (levees not part of the State Plan of Flood Control) not located within the Sacramento-San Joaquin Delta; LLUR - Repair and improvement of critically damaged local levees (levees not part of the State Plan of Flood Control) located within the Sacramento-San Joaquin Delta	LOLE - Evaluation of levees that are part of the State Plan of Flood Control or that are located within the Sacramento-San Joaquin Delta; LLUR - Repair or improvement of levees that are part of the State Plan of Flood Control for the Central Valley or are located within the Sacramento-San Joaquin Delta	LOLE - $1 million per applicant; LLUR - $5 million per applicant	Program guidelines and solicitation package expected to be released by Spring 2010 Check website (www.water.ca.gov/floodSAFE) for updates	David Wright (916) 574-2644
Proposition 84 Flood Protection Corridor Program	Department of Water Resources	Grant	Flood risk reduction through non-structural projects that include wildlife habitat enhancement and/or agricultural land preservation components	Local government agencies or nonprofit organizations	CEQA	Funding acquisition of real property or easements in a floodplain from willing sellers; preserving or enhancing flood-compatible agricultural use; restoration of habitat compatible with seasonal flooding; and related activities	Flood protection projects that do not include wildlife habitat enhancement or agricultural land preservation benefits	$5 million per eligible project	Next funding cycle expected in 2010 Check website (www.water.ca.gov/floodSAFE) for updates	Earl Nelson (916) 574-1244
Proposition 84 Flood Control Subventions Program	Department of Water Resources	Grant (Claims Reimb.)	Implementation of federally-authorized flood control projects (minor or major) and Watershed Protection Flood Prevention Projects	Local public agencies	CEQA/ NEPA	Major flood control projects authorized by Congress; small flood control projects authorized by PL 80-858 and the U.S. Army Chief of Engineers; and watershed protection projects, which include projects authorized by the Administrator of the Natural Resources Conservation Service	Flood control projects without federal authorization	Variable state cost-share percentage based on multi-purpose objectives for projects, ranging from a minimum of 50% to a maximum of 70%	Claim submittals accepted on continuous basis Claims paid based on available State funding Check website (www.water.ca.gov/floodSAFE) for updates	Varda Disho (916) 574-2745

Program	**Department**	Type	Purpose	**Eligibility** Requirements	**CEQA/ NEPA**	Eligible Uses	**Ineligible Uses**	**Funding Limits**	Terms/Dates	**Contact**
Proposition 84 Urban Streams Restoration Program	Department of Water Resources	Grant	Reduce urban flooding and erosion, restore environmental values, and promote stewardship of urban streams	Local government agencies and citizens groups/nonprofits (together)	CEQA	Examples include creek cleanups; eradication of exotic or invasive plants; revegetation efforts; bioengineering bank stabilization projects; channel reconfiguration to improve stream geomorphology and aquatic habitat functions; acquisition of parcels critical for flood management; and coordination of community involvement in projects		$1 million per eligible project	**This program has been suspended** Check website (www.grantsloans.water.ca.gov) for updates on the next funding cycle	Sara Denzler (916) 651-9625
Proposition 84 Local Groundwater Assistance	Department of Water Resources	Grant	Assistance for local public agencies to conduct groundwater studies or carry out groundwater monitoring or management activities	Local public agencies	CEQA	Groundwater data collection, modeling, monitoring, and management studies; monitoring programs; installation of monitoring wells and equipment; basin management; development of information systems; groundwater planning; and other groundwater management related activities	Projects without a clear nexus to groundwater management, projects which solely benefit private landowners or water users, research not directly related to groundwater management, and most production wells	$250,000 per eligible project or study	$4.68 million appropriated for FY 2009-10 funding cycles Check website (http://www.water.ca.gov/lgagrant/) for updates	Jerry Snow (916) 651-9264
Proposition 1E Floodway Corridor Program	Department of Water Resources	Grant	Similar to the Flood Protection Corridor Program—flood risk reduction through primarily non-structural projects, but focus will likely be on protecting urban areas	Local public agencies or nonprofit/citizens groups	CEQA	Funding acquisition of property rights from willing sellers and related activities for floodway corridor projects, particularly those that will reduce flood risk for urban areas	Flood protection projects that do not include wildlife habitat enhancement or agricultural land preservation benefits	$5 million per eligible project.	Next funding cycle expected in 2010 Check website (www.water.ca.gov/floodSAFE) for updates	Earl Nelson 916 574-1244

Program	**Department**	Type	Purpose	**Eligibility** Requirements	**CEQA/ NEPA**	Eligible Uses	**Ineligible Uses**	**Funding Limits**	Terms/Dates	**Contact**
Proposition 1E/ Proposition 84 Early Implementation Projects (State-federal Flood Control System Modification Program)	Department of Water Resources	Grant	Rehabilitate, reconstruct, or replace levees, weirs, bypasses, and facilities of the State Plan of Flood Control; or improve or add to facilities of the State Plan of Flood Control to increase flood protection levels for urban areas	Local public agencies and Federal agencies Projects are or would become facilities of the State Plan of Flood Control Projects are consistent with objectives of Propositions 1E and 84	CEQA/ NEPA	Rehabilitation, reconstruction, or replacement of levees, weirs, bypasses, or other facilities of the State Plan of Flood Control and improvement or addition of facilities to the State Plan of Flood Control to increase flood protection levels for urban areas	Flood control projects involving facilities outside the State Plan of Flood Control	To be determined under program guidelines, which are being developed	Solicitation for project proposals to be announced upon release of final program guidelines—expected by December 2010 Check website (www.water.ca.gov/floodSAFE) for updates	Darryl Brown (916) 574-2646
Proposition 1E CVFPB Capital Outlay Projects and Studies	Department of Water Resources	Grant	Evaluate, rehabilitate, reconstruct, or replace levees, weirs, bypasses, and facilities of the State Plan of Flood Control; to increase flood protection levels for urban areas	Local public agencies and Federal agencies Projects are facilities of the State Plan of Flood Control Projects are consistent with objectives of Propositions 1E and 84	CEQA/ NEPA	Evaluate, rehabilitation, reconstruction, or replacement of levees, weirs, bypasses, or other facilities of the State Plan of Flood Control.	Flood control projects involving facilities outside the State Plan of Flood Control – Must meet Federal Interest Requirements	In accordance with Corps, State and Local Agreements	Next Federal and State funding cycle expected in 2010	Kent Zenobia (916) 574-2639
Proposition 1E (Article 4, §5096.827) Stormwater Flood Management Program	Department of Water Resources	Grant	Stormwater management projects that reduce flood damage	Local agency or nonprofit representing an IRWM effort Project is located outside the State Plan of Flood Control Project must be part of an existing IRWM Plan and be consistent with applicable Water Quality Basin Plan	CEQA	Projects designed to manage stormwater runoff to reduce flood damage	Operations and maintenance activities	$30 million per eligible project See SBxx1 (Perata) for additional information on funding allocations	$300 million available Anticipate draft guidelines and application Feb/Mar 2010 Each Proposal Solicitation Package will have predetermined amount of funds available. 50% cost share (no ability to waive or reduce for DAC)	Joe Yun (916) 651-9222

Program	**Department**	Type	Purpose	**Eligibility** Requirements	**CEQA/ NEPA**	Eligible Uses	**Ineligible Uses**	**Funding Limits**	Terms/Dates	**Contact**
									Check website (www.grantsloans.water.ca.gov/grants/irwm/integregio.cfm) for updates	
Agricultural Drainage Management Loan Program	State Water Resources Control Board	Loan	Loans to address treatment, storage, conveyance, or disposal of agricultural drainage water	Cities, counties, districts, joint powers Authority, or other political subdivisions of the State	CEQA	Acquisition and construction, tailwater recovery, filter, drainage, recirculation, and high efficiency irrigation equipment	Land	$5 million per project $100,000 for feasibility studies	Interest rate is ½ of the general obligation bond Repayment term of 20 years	Ahmad Kashkoli (916) 341-5855
319(h) Nonpoint Source Implementation Program	State Water Resources Control Board	Grant	Provide grants to projects that implement watershed based plans to restore impaired water bodies through the control of nonpoint source pollution consistent with completed Total Maximum Daily Loads (TMDLs)	Local Public Agencies, Public Agencies, Public Colleges, 501(c)(3) Non-Profit Organizations, Federally Recognized Indian Tribes, State Agencies*, Federal Agencies* (*If collaborating w/local entities involved in watershed mgmt or if proposing a statewide project)	CEQA/ NEPA	Development of watershed based plans and implementation of management measures to control nonpoint source pollution		Implementation Minimum: $250,000 Implementation Maximum: $1 million Planning Minimum: $125,000 Planning Maximum: $750,000	Approximately $4.5 - 5.5 million per year Next funding cycle possibly Fall 2009 for FFY '09-10 funds	Patricia Leary (916) 341-5167
Non-Point Source Program (through the Clean Water State Revolving Fund [CWSRF] Expanded Use Program)	State Water Resources Control Board	Financing	Financing to protect water quality	Public agencies, nonprofits, and private parties (through special arrangement)	CEQA or CEQA +	Land acquisition to protect habitat/water quality; stormwater management; irrigation/drainage management; hydromodification; forestry; marinas; abandoned mines; animal feeding operations; estuary enhancement; and others	Actions required by National Pollutant Discharge Elimination System (NPDES) permits	$50 million per project per year	Interest is ½ of the latest general obligation bond (interest rate reductions may be available in the future) Repayment term of up to 20 years	Julé Rizzardo (916) 341-5822

Program	**Department**	Type	Purpose	**Eligibility** Requirements	**CEQA/ NEPA**	Eligible Uses	**Ineligible Uses**	**Funding Limits**	Terms/Dates	**Contact**
Proposition 84 Storm Water Grant Program	State Water Resources Control Board	Grant	Provide grants for projects designed to reduce and prevent storm water contamination of rivers, lakes, and streams	Local public agencies	CEQA	Implementing low-impact development and other onsite and regional practices, on public and private lands Complying with stormwater-related total maximum daily load (TMDL) requirements established pursuant to section 303(d) of the Clean Water Act (33 U.S.C. § 1313(d)) and Division 43 of the California Public Resources Code (PRC)	Operations and maintenance activities	$3 million per project	Suspended due to bond freeze. Next funding cycle possibly 2010. Applications through FAAST	Erin Ragazzi (916) 341-5733
Energy Partnership Program	California Energy Commission	Technical Assistance (No cost to the applicants)	To identify energy efficiency and cost effectiveness measures at the W&WW facilities	Water and wastewater treatment facilities owned and/or operated by the cities, counties, special districts, or other non-profit entities.	None	A number of services can be provided. For details, please refer to the website: http://www.energy.ca.gov/efficiency/partnership/index.html	State of California/Federal Government Departments; or profit systems	Technical services of up to $20,000 (consultants costs depending on the facility size, type and scope of the study; No cost to the applicants)	Not applicable	Shahid Chaudhry (916) 654-4858
Energy Financing Program	California Energy Commission	Loan	Provides financing for water & wastewater facilities through low-interest loans for feasibility studies and implementing energy-saving measures.	Water and wastewater treatment facilities owned and/or operated by the cities, counties, special districts, or other non-profit entities.	None	Partial list includes: Lighting, motors or variable frequency drives and pumps, building insulation, HVAC modifications, automated energy management systems/controls, energy generation including renewable energy projects and cogeneration etc. For details, please refer to the website:	State of California/Federal Government Departments; or profit systems	Finance up to 100% of the cost of energy efficiency projects. The maximum loan amount is $3 million per application. There is no minimum loan amount.	Projects must have a simple payback of 10 years or less based on energy costs savings.	Shahid Chaudhry (916) 654-4858

Program	**Department**	Type	Purpose	**Eligibility** Requirements	**CEQA/ NEPA**	Eligible Uses	**Ineligible Uses**	**Funding Limits**	Terms/Dates	**Contact**
						http://www.energy.ca.gov/efficiency/financing/index.html				

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