MOKELUMNE INTERREGIONAL SUSTAINABILITY EVALUATION (MOKEWISE) PROGRAM FINAL REPORT – PUBLIC DRAFT

MAY 2015
RMC Water and Environment
San Joaquin Groundwater Basin Authority
Upper Mokelumne River Watershed Authority

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ACRONYMS

Acronyms

ACCG	Amador Calaveras Consensus Group
AF	Acre-feet
AFY	Acre-feet per year
AWA	Amador Water Agency
BARDP	Bay Area Regional Desalination Project
BLM	Bureau of Land Management
BMPs	Best Management Practices
CCWD	Calaveras County Water District
CEQA	California Environmental Quality Act
cfs	Cubic feet per second
CHRC	California Hydropower Reform Coalition
CII	Commercial, industrial, and institutional
CPUD	Calaveras Public Utilities District
CUWCC	California Urban Water Conservation Council
CWAP	California Water Action Plan
CWP	California Water Plan
DACs	Disadvantaged communities
DFW	California Department of Fish and Wildlife
DWR	California Department of Water Resources
EBMUD	East Bay Municipal Utility District
EDF	Environmental Defense Fund

ERRK	Earth and rock
ESJ	Eastern San Joaquin
FERC	Federal Energy Regulatory Commission
GBA	North Eastern San Joaquin County Groundwater Basin Authority
GHG	Greenhouse gas
gpcd	Gallons per capita per day
gpd	Gallons per day
GWMP	Groundwater Management Plan
IPCC	International Panel on Climate Change
IRWM	Integrated Regional Water Management
JPA	Joint Powers Authority
JSA	Joint Settlement Agreement
JVID	Jackson Valley Irrigation District
LID	Low impact development
MAC	Mokelumne-Amador-Calaveras
MAF	Million acre-feet
MCG	Mokelumne Collaborative Group
MGD	Million gallons per day
MHI	Median household income
MHSD	Mokelumne Hill Sanitary District
MOCASIM	Mokelumne-Calaveras Simulation Model
MokeWISE	Mokelumne Watershed Interregional Sustainability Evaluation
MOU	Memorandum of Understanding

MRDUA	Mokelumne River Day Use Area
MRF	Mokelumne River Forum
NEPA	National Environmental Policy Act
NGOs	Non-governmental organizations
NMFS	National Marine Fisheries Services
NSJWCD	North San Joaquin Water Conservation District
PG&E	Pacific Gas and Electric
PIPE	Public Interest Profile Enhancement
RMS	Resource Management Strategies
SCWA	Sacramento County Water Agency
SEWD	Stockton East Water District
SJCFCWCD	San Joaquin County Flood Control and Water Conservation District
SWRCB	State Water Resources Control Board
TAF	Thousand acre-feet
UMRWA	Upper Mokelumne River Watershed Authority
UWMP	Urban Water Management Plant
WID	Woodbridge Irrigation District
WTP	Water treatment plant
WWTP	Wastewater treatment plant

1 INTRODUCTION

Introduction

Each day, water resource managers are faced with the challenge of balancing competing needs for increasingly precious water supplies between drinking water, environmental needs, recreation, and other uses. Integrated water resource management techniques allow optimization of limited supplies by identifying multi-benefit solutions that incorporate the needs and concerns of a variety of stakeholders.

The Mokelumne Watershed Interregional Sustainability Evaluation (MokeWISE) Program emerged following years of dialogue among a diverse set of stakeholders in the Upper and Lower Mokelumne River watersheds. The Program is intended to develop and evaluate alternatives to optimize water resources management within the Mokelumne River watershed by developing a broadly-supported preferred water resources program that meets the needs of the upper and lower watersheds as well as the needs of regional stakeholders and interest groups.

PROJECT BACKGROUND

Nearly ten years ago, the State of California embarked on a new venture to implement integrated planning at the regional level, known as Integrated Regional Water Management (IRWM) planning. Over time, this program has evolved into a major water resources planning framework implemented statewide, and the California Water Plan cites IRWM as a new paradigm for water planning. Through the IRWM program, the State of California has encouraged collaboration among water supply and wastewater agencies, flood control and stormwater protection districts, resource and regulatory agencies, non-governmental organizations, local governments, and volunteer groups to enhance integration in water management planning – all at the regional level. Through this planning framework, the efforts of individual entities and communities are combined to leverage resources and meet multiple water resource management objectives.

MokeWISE was initiated by two adjacent IRWM Regions: the Mokelumne-Amador-Calaveras (MAC) and Eastern San Joaquin (ESJ) IRWM Regions. Together, these regions applied for and received a grant from the California Department of Water Resources (DWR) through Proposition 84 to develop a joint plan for water resources management in the Mokelumne River watershed.

The objectives of the MokeWISE Program were to develop and evaluate alternatives to optimize water resources management within the MAC and ESJ Regions and to develop a broadly-supported preferred water resources program that meets both regions' needs as well as the needs of regional stakeholders and interest groups.

SETTING AND PROJECT NEEDS

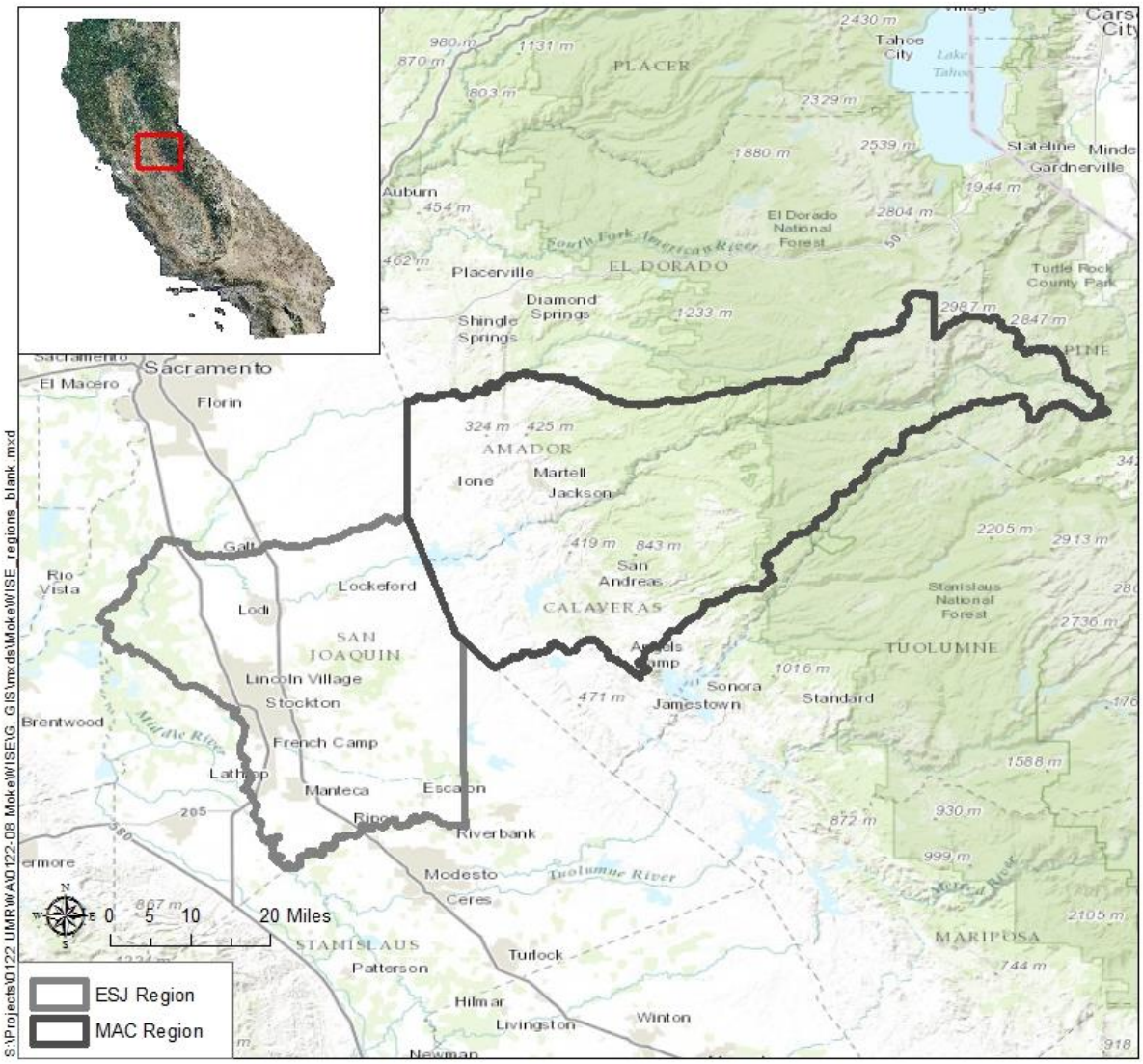
As shown in **Figure 1**, the eastern border of the ESJ region is the western border of the MAC region. The county line between Amador County and San Joaquin County and the county line between Calaveras County, Stanislaus County, and portions of San Joaquin County constitute the interface between the two regions. The two IRWM regions have remained separate because of the differing water supply issues, with the ESJ region predominately focused on groundwater and the MAC region on surface water. In addition, the significant number of agencies and non-governmental organizations interested in water resource issues in both the valley and the foothills and the large physical distance between the outlying areas of the two regions would impede effective stakeholder participation.

Although they are separate IRWM regions, some of the participants of the MAC and ESJ regions have been engaged in regular coordination and communication (through the Mokelumne River Forum and other groups) for many years regarding their common interests and issues, with the goal of evaluating interregional opportunities to enhance integrated water management efforts. Through the regular dialogue that has taken place over this time, the two regions have recognized a need for effective interregional coordination as the basis for evaluating potential opportunities and establishing multi-benefit interregional programs and projects. The two regions realize that working together, rather than independently, is the most promising approach to addressing critical water resource issues spanning the two adjoining regions. They also understand that broad and diverse stakeholder agreement is key to the success of any interregional project.

ESJ and MAC Interregional Conflicts and Synergies

While each of the respective IRWM Plans focuses on meeting needs within the individual region, the different water resource characteristics of the two regions pose a unique opportunity to meet a broader range of needs and provide greater benefits through interregional cooperation. Because the ESJ and MAC IRWM regions are adjacent and share common interests and issues, the two IRWM Plans include a joint chapter regarding interregional projects. The MokeWISE Program represents the culmination of years of collaboration on the part of a diverse group of stakeholders in the Mokelumne River watershed. The purpose of the MokeWISE Program is to provide interregional water supply, water quality, and environmental benefits in Amador, Calaveras, and San Joaquin Counties, and within the East Bay Municipal Utility District (EBMUD) service area.

Figure 1: MAC and ESJ IRWM Regional Boundaries



Mokelumne River Forum

The interregional sections of both the MAC and ESJ IRWM Plans identify the Mokelumne River Forum (MRF) as the appropriate venue for working with stakeholders to develop potential interregional projects that improve water resources management within the two adjacent planning regions. Before MokeWISE, the MRF had been the vehicle for both regions to coordinate beyond IRWM regional boundaries. The MRF provided an opportunity for ongoing coordination and exploration of potential interregional water resource project alternatives, specifically for agencies that rely on the Mokelumne River as a water supply. The MRF aimed to improve water reliability by:

- Developing regionally-supported projects
- Creating long-term, cooperating working relationships among Mokelumne water interests
- Maintaining and improving regional economic health
- Preventing environmental degradation that can affect water quality

The MRF was an open stakeholder process intended to resolve conflicts and improve water supply availability and reliability in the Mokelumne River basin. In April 2005, members of the MRF signed a Memorandum of Understanding (MOU) and agreed to work cooperatively to develop mutually beneficial solutions to meet water supply and related needs of the region that can be widely accepted. MOU signatories included:

- The State of California Department of Water Resources (DWR)
- Alpine County, Amador County
- Amador Water Agency
- Calaveras County Water District
- Calaveras Public Utilities District (CPUD)
- The City of Lodi
- The City of Stockton
- East Bay Municipal Utility District (EBMUD)
- Jackson Valley Irrigation District (JVID)
- North San Joaquin Water Conservation District
- San Joaquin County Flood Control and Water Conservation District (SJCFCWCD)
- Mokelumne River Water and Power Authority
- Stockton East Water District (SEWD)
- Central San Joaquin Water Conservation District
- Woodbridge Irrigation District
- The San Joaquin Farm Bureau Federation

The MRF was also open to other organizations and groups that were not MOU signatories but had a direct interest in the Forum's goals. Prior to the beginning of MokeWISE, a collaborative planning process had been underway in which MRF participants were coordinating various water resources planning efforts across regional boundaries with respect to river hydrology, facilities, infrastructure and institutional arrangements required for the interregional projects. The MRF was very effective in developing improved understanding and expanded purpose among the valley interests (within the ESJ region) and the foothill interests (within the MAC region). Indeed, the MRF was instrumental in

brokering a more comprehensive approach to integrated management of the Mokelumne River to extend beyond the confines of a conjunctive use project.

This improved understanding is evidenced by an MOU between the two regions to move forward with this grant application for the Mokelumne WISE Program. Upper Mokelumne River Watershed Authority (UMRWA) and the North Eastern San Joaquin County Groundwater Basin Authority (GBA) entered into an MOU on October 10, 2011 agreeing to prepare and submit a joint Proposition 84 interregional planning grant application to seek funding for investigating interregional opportunities that further the water supply, water quality, and environmental stewardship objectives of each region.

WHERE DO WE GO FROM HERE?

Given the nature of water resources in the MAC and ESJ Regions – with the MAC region largely dependent on surface water and the ESJ region largely dependent on groundwater – evaluating water supply, water quality, and environmental stewardship opportunities within a single region limits each region's ability to optimize water resources for maximum benefit. Developing a program that uses a bi-regional approach helps to build on the strengths of both regions while maximizing water resource, flood management, and environmental stewardship opportunities.

The MokeWISE Program offers this bi-regional approach by bringing together stakeholders from both regions, including water agencies, non-governmental organizations, agricultural interests, and planning organizations. In developing the MokeWISE Program, the MAC and ESJ Regions will have a comprehensive understanding of opportunities and alternatives for enhanced integrated water resource management, which will ultimately strengthen both IRWM Plans. Implementing the MokeWISE Program will further provide a blueprint for achieving bi-regional consensus with respect to managing surface water and groundwater resources in the watershed.

2 STAKEHOLDER AND PUBLIC INVOLVEMENT

Stakeholder and Public Involvement

Stakeholder and public involvement was a foundational component in the MokeWISE program process and outcome. Stakeholder and community input and involvement in the MokeWISE process helped to bring water resource issues of concern to the broader public forward to be addressed by the MokeWISE program. There are two broad components of MokeWISE stakeholder and public involvement, including the Mokelumne Collaborative Group (MCG) and the general public. The MCG was responsible for guiding the development of the MokeWISE program and for initiating public outreach. The following sections highlight the development and role of the MCG, as well as the public outreach process implemented by the MCG.

MOKELUMNE COLLABORATIVE GROUP

During July and August 2013, the MokeWISE Planning Committee, comprised of representatives from the grant recipient agencies (UMRWA and the GBA) and the technical and facilitation consultants, met to identify potential organizations for inclusion in the stakeholder group tasked with guiding the MokeWISE program. Extensive phone outreach was performed to identify which agencies and entities had an interest in participating. Once these interested stakeholders were identified, one-on-one in-person and telephone interviews were conducted by members of the Planning Committee to review stakeholder group member commitment expectations, collect initial thoughts regarding stakeholder group process and organization, and answer any questions. Stakeholders were also asked to identify other potential organizations for outreach and inclusion in the effort. Once all interested organizations had been contacted and interviewed, an initial stakeholder meeting was scheduled.

The MCG is the stakeholder body that was established as a result of this outreach and provided the primary direction in formulating the MokeWISE program. Comprised of organizations with a direct and expressed interest in the Mokelumne River watershed and the MokeWISE program, the MCG provided direction for developing the MokeWISE program. MCG members committed to an intensive work schedule that included monthly group meetings and regular document review for a 22-month period. MCG members included water agencies; non-governmental organizations (NGOs); private entities; resource agencies; and local and state agencies. The MCG member agencies are listed below (refer to **Appendix A**).

- Amador County
- Amador Water Agency
- Calaveras County

- Calaveras County Water District
- Calaveras Planning Coalition
- Calaveras Public Utility District
- California Sportfishing Protection Alliance
- City of Lodi, Public Works
- City of Stockton, Municipal Utilities
- Delta Fly Fishers, Inc.
- East Bay Municipal Utility District
- Foothill Conservancy
- Jackson Valley Irrigation District
- MyValleySprings.com
- North San Joaquin Water Conservation District
- Pacific Gas and Electric
- Restore the Delta
- San Joaquin County
- San Joaquin County Resource Conservation District
- San Joaquin County, Public Works
- San Joaquin Farm Bureau
- Sierra Club California
- Sierra Nevada Conservancy
- Stockton East Water District
- Trout Unlimited (state level)
- Woodbridge Irrigation District

The overall outcome of the MokeWISE program required MCG members to work together in a respectful, collaborative environment, with the diversity of the MCG contributing to a more complete and inclusive program. To begin fostering relationships and developing common understandings, MCG members were asked to draft interest statements that were distributed to the entire MCG. This exercise helped individual MCG member entities clarify for other MCG members their overarching interest in and desired outcomes for the MokeWISE program.

With this initial understanding in place, the MCG established a structure and forum in which they could work together in a respectful, collaborative manner. One early task completed by the MCG involved developing procedures and guidelines by which the MCG would manage its organizational composition, participation, decision-making, documents, and the media. The MCG Protocols Memorandum was developed to guide the MCG process with

the intention of developing a broadly-supported preferred water resources program that meets the needs of regional stakeholders and interest groups. The Protocols Memorandum can be found in **Appendix B**.

MCG Structure and Organization

MCG meetings began at 9AM on the second Friday of each month and were typically held at the San Joaquin Farm Bureau. Two meetings were held at EBMUD's Pardee Center in the upper watershed. Each meeting was open to the public with a designated public comment period. High level summaries of each meeting were prepared incorporating what was discussed, key factors considered during discussions, and the ultimate decision and rationale. Meeting summaries, once approved by the MCG, were posted onto the public portion of the MokeWISE website. Summaries from each of the MCG meetings can be found in **Appendix C**.

In an effort to foster collaboration and understanding between and among MCG member entities, members were invited to give presentations about their entities to the MCG. These presentations provided an opportunity to share information about each entity with the larger MCG. Presentations often included the history, mission, and current programs of individual member entities of the MCG. With approval from each participating entity, presentations were posted to the protected portion of the website for reference by the MCG.

The MCG decision-making and approval process was built on consensus with an "I/we can live with it" standard. Once a document was approved, it would be posted to the public portion of the website. The MCG approved Protocols Memorandum stated that if the MCG failed to reach consensus on a discrete issue, outstanding concerns or opinions were to be characterized and attached to the document in question. All documents prior to the Implementation Plan were approved without exception. The MCG agreed that when communicating with the media, members would only express their own concerns and interests and would refrain from characterizing the interests, intentions, or motivations of other stakeholders in the process.

All MCG-approved documents developed in support of the effort are included on the project webpage, which is accessible to the public.

PUBLIC OUTREACH AND INVOLVEMENT

To formalize a public outreach and involvement process, the MCG outlined a Public and Disadvantaged Community Outreach Plan. This Plan describes the strategy that was followed to obtain input from stakeholder interests and the public, referred to as stakeholder tiers. The MCG identified five tiers of stakeholders, each requiring varying levels of public outreach. The five tiers included: Tier 2 stakeholders, interested parties, the general public,

disadvantaged communities (DACs), and Native American tribes. Through various outreach methods including public workshops, press releases, flyers, website postings, and email notifications, the stakeholder tiers were made aware of the MokeWISE program and progress. The Public and Disadvantaged Community Outreach Plan can be found in **Appendix D**. Additional information on each stakeholder tier and associated outreach efforts is provided in the following sections.

Stakeholder Tiers

Outreach was performed to target the following discrete "tiers" of stakeholders, based on their anticipated level of interest and ability to engage in program development.

- **Tier 2 stakeholders** included state and federal resource agencies, cities or other organizations that, due to budgetary and/or staffing restrictions, were unable to participate in the MCG. While Tier 2 stakeholders had no decision-making authority in the MCG, the MCG solicited feedback from these stakeholders at various program milestones. A Tier 2 stakeholder from the California Department of Fish and Game was part of the Modeling Workgroup and provided insight for that effort (see **Mokelumne River**).
- **Interested parties** included agencies, organizations and individuals that had registered their interest in the MokeWISE program but were neither members of the MCG nor Tier 2 stakeholders.
- **General public** included residents living in the upper and lower watershed and others with a potential and general interest in the MokeWISE program.
- **Disadvantaged communities** (DACs) were defined consistent with the definition established by the State of California as communities with an annual median household income (MHI) that is less than 80 percent of the statewide MHI. Based on current U.S. Census data, a community with an MHI of $48,706 or less is considered a DAC. DAC participation in the MokeWISE program was achieved at two levels: by MCG members and Tier 2 stakeholders who, in conjunction with their official agency duties, represented DAC communities while developing the various milestone MokeWISE program components; and by conducting some of the planned public workshops in DAC communities.
- **Native American** tribes in the region included the Ione and Jackson Rancheria Native American Bands. Direct outreach was performed to gage the interest of these entities in participating in the program. Given the requirements necessary for MCG participation, the Jackson Rancheria Band opted to participate as Tier 2 stakeholders; no response was received from the Ione Band.

Outreach Methods

Public workshops were held at strategic points throughout the MokeWISE program. These meetings were held to keep the general public, including DACs, informed of project status and provide a structured opportunity for the public to offer comments, questions, and concerns. All public meetings were held in communities classified as DACs.

The public outreach meetings were held as follows:

1. February 19, 2014; overview of MokeWISE program and purpose; held at Amador County Board of Supervisors Building in Jackson, CA. There were three members of the public present, in addition to a number of MCG member entities.
2. July 10, 2014; finalized program objectives, finalized baseline environmental conditions, and water availability approach; held at San Joaquin Farm Bureau in Stockton, CA. There were four members of the public in attendance, in addition to several MCG member entities.
3. January 8, 2015; program options and preliminary assessment of options; held at Calaveras County Water District Boardroom in San Andreas, CA. There were 12 members of the public present, in addition to a number of MCG member entities.
4. April 9, 2015; concept development; held at San Joaquin Farm Bureau in Stockton, CA. This meeting was tailored to resource agencies. Personal email invitations and phone calls where appropriate were made to all resource agencies on the Tier 2 stakeholder list. There were four members of the public in attendance, in addition to several MCG member entities. No representatives from resource agencies were present.
5. June 1, 2015 (anticipated); implementation plan and final report; to be held at San Joaquin Farm Bureau in Stockton, CA.

Prior to each public outreach meeting, emails were sent to the Tier 2 and Interested Parties lists alerting each stakeholder of the time, date, and location of the public meeting. Additionally, press releases suitable for posting on agency and NGO websites were prepared in advance of each of the five public workshops; these releases were posted to the MokeWISE website and given to MCG members for posting. The press releases were also sent to major newspapers within the watershed, including the Lodi Sentinel, Stockton Record, Calaveras Enterprise, and Amador Dispatch. Flyers for each public outreach meeting were posted to the MokeWISE website and provided to MCG members to send to their constituents. At each of the public meetings, copies of the meeting agenda and PowerPoint slides were provided to attendees. Sign-in sheets were used to collect emails which were then added to the Interested Parties list.

In addition to public meetings, stakeholders were also invited to participate in MCG meetings. Every regularly scheduled MCG meeting was open to the public and included a

specified public comment period. This period provided an opportunity for members of the public to speak directly to the MCG and offer comments, questions, suggestions, or other guidance.

The MokeWISE stakeholder involvement process also provided avenues for stakeholder comment on documents. After documents were approved by the MCG and posted on the MokeWISE website, the public and Tier 2 stakeholders were given the opportunity to respond with comments. Email notifications were sent to both Tier 2 and Interested Parties stakeholders when approved deliverables were posted to the website. Tier 2 stakeholders and Interested Parties were given two weeks to provide comments on milestone documents, including the Baseline Environmental Conditions Technical Memorandum and the Water Availability Analysis, which are both discussed in **Section 4**.

3 PROGRAM OUTCOMES AND MEASURES

Program Outcomes and Measures

The MCG established priorities for the MokeWISE program intended to guide development of the MokeWISE program and provide a structure for gauging its success. As discussed in **Section 2**, MCG members were asked to provide interest statements summarizing their general interest in the MokeWISE program. As part of this exercise, MCG members were also asked to include initial thoughts related to potential benefits to be achieved.

After this initial collection of thoughts related to benefits and consequences, members of the MCG were then asked to complete a table further summarizing their entities' desired benefits to be achieved and potential consequences to be avoided by the program, as well as potential ways of measuring these outcomes. The information provided through this exercise was compiled with the goal of identifying areas of common interest, which were used to develop joint program objectives and measures.

The compiled information was ultimately used to formulate the MokeWISE Program Objectives to be Achieved and Consequences to be Avoided ("Program Objectives"), which were modified, revised, and accepted by the MCG. The Program Objectives served as a guide to determine how well the MokeWISE program addressed the priorities and objectives of the MCG. The Program Outcomes and Measures Memorandum, which details the process and includes the interest statements provided by MCG members, can be found in **Appendix E**. **Table 1** presents the MCG approved MokeWISE Program Objectives to be Achieved and **Table 2** presents the MCG approved MokeWISE Program Consequences to be Avoided which together constitute the Program Objectives.

The Program Objectives served as a basis for assessing project concepts developed by the MCG. This is further discussed in **Section 5**.

TABLE 1: MOKEWISE PROGRAM OBJECTIVES TO BE ACHIEVED

CATEGORY	OBJECTIVE	SUMMARY
Water Supply	WS-1: Promote demand-side management strategies	The program should promote projects and policies that support demand-side management strategies including conservation, water use efficiency, peak period rationing and leak detection.
	WS-2: Increase supply reliability	The program should result in increased water supply reliability for water purveyors.
	WS-3: Increase amount of stored water	The program should result in an increase in the amount of water stored within the watershed and consider both ground and surface options.
	WS-4: Promote smart, responsible development	The program should promote projects and policies that ensure that the water needs of new development are met while limiting negative externalities and end use harm.
	WS-5: Reduce reliance on groundwater for irrigation	The program should result in a reduced reliance on groundwater for irrigation and explore surface water alternatives.
	WS-6: Promote a long-term groundwater balance	The program should promote projects and policies that seek to contribute to a positive long-term groundwater balance.
	WS-7: Maximize water resource availability for all beneficial uses	The program should promote projects and policies that allocate water to the full spectrum of beneficial uses based on full analysis of all potential sources of supply.
	WS-8: Decrease the need to import water	The program should seek to implement state legislative goals to improve self-sufficiency and reduce the need to import water
Water Demands	WD-9: Review and understand existing agency demand estimates	The MCG should review and come to a common understanding of water demand estimates described in existing planning documents
	WD-10: To identify water demand issues for timely consideration by the water agencies during their next Urban Water Management Plan (UWMP) update.	The program should identify issues and analyses for water agencies to consider as they prepare demand and population estimates.
Water Quality	WD-11: Protect and improve surface and groundwater quality	The program should result in improved water quality within the watershed for both surface water and groundwater.
	WD-12: Match delivered water quality to use	The program should try to avoid wasting high quality water on uses that do not need it.

TABLE 1: MOKEWISE PROGRAM OBJECTIVES TO BE ACHIEVED

CATEGORY	OBJECTIVE	SUMMARY
	WD-13: Use water purification technology as a tool to maximize beneficial uses	The program should seek to implement the state's legislative goals to use water purification technology as a tool to increase the beneficial uses of water.
Recreation	R-14: Increase access for water-based recreation	The program should result in increased access to the Mokelumne River from Highway 12 to the headwaters.
	R-15: Increase angling and other recreational opportunities	The program should result in increased spawning habitat, designating sections of the river for hatchery and wild species, and designating appropriate environmental flows.
	R-16: Increase angling and other recreational opportunities	The program should result in the stocking of hatchery-raised trout in designated areas on the Upper Mokelumne and designating and managing wild trout sections.
	R-17: Increase angling and other recreational opportunities	The program should result in the reintroduction of salmon in the Upper Mokelumne river.
	R-18: Increase angling and other recreational opportunities	The program should result in increased angling, harvesting, and other recreational opportunities.
Water Rights	WR-19: Resolve existing water rights conflicts in the watershed	The program should seek to resolve existing water rights protests and to achieve a common understanding of the application of relevant water rights law in the watershed.
Flood Management	F-20: Enhance flood protection and management	The program should result in multi-benefit projects which provide flood protection for residents and businesses within the watershed and enhance ecosystem function.
Data	D-21: Use sound, agreed-upon data to evaluate program alternatives	The program should produce an agreed-upon hydrology dataset and Water Availability Analysis
	D-22: Use sound, agreed-upon data to evaluate program alternatives	Program components should be described with sufficient detail to allow for evaluation.
	D-23: Promote the contribution of sound scientific data to current body of knowledge	The program should generate and promote projects with monitoring and reporting requirements to increase water resources data
Other Human Values	O-24: Increase investment in forest management	The program should promote forest management that reduces the economic impact of wildfires and other natural disasters, particularly on water supply.

TABLE 1: MOKEWISE PROGRAM OBJECTIVES TO BE ACHIEVED

CATEGORY	OBJECTIVE	SUMMARY
	O-25: Maximize socio-economic, cultural, recreational, public health, and public safety benefits with a particular emphasis on disadvantaged communities (DACs)	The program should seek to design projects and policies to improve socio-economic, cultural, recreational, public health, and public safety benefits with a particular emphasis on DACs.
	O-26: Achieve equity	The program should be designed to achieve equity across regions, cultures, incomes, and time.
Environment	E-27: Protect and enhance natural environment	The program should result in the protection and enhancement of the natural environment of the Mokelumne watershed.
	E-28: Protect and enhance natural environment	The program should include support for wild and scenic designation of the Mokelumne River down to the Pardee High Pool.
	E-29: Protect and restore fisheries	The program should protect, restore, and enhance fisheries in the Mokelumne River downstream of Woodbridge Dam.
Agricultural Benefits	A-30: Enhance or maintain the water supply for beneficial use of agricultural practices	The project should increase the current agricultural water supply
Collaboration	C-31: Foster long-term regional relationships and avoid unnecessary conflict and litigation	The program should foster long-term regional relationships which will promote continued collaboration on water management issues and reduce unnecessary litigation.
	C-32: Promote broadly-supported outcomes that benefit a wide range of interests	The program should promote projects and policies that support outcomes benefiting a wide range of interests within the watershed.
	C-33: Promote broadly-supported outcomes that benefit a wide range of interests	The program should promote the least controversial projects and policies.
	C-34: Promote broadly-supported outcomes that benefit a wide range of interests	The program should result in agreements that reduce conflict.

TABLE 1: MOKEWISE PROGRAM OBJECTIVES TO BE ACHIEVED

CATEGORY	OBJECTIVE	SUMMARY
	C-35: Develop a program consistent with all existing licenses, permits, and agreements affecting the River	The program should facilitate a common understanding of the requirements contained in all existing licenses, permits, and agreements affecting the Mokelumne River and ensure that MCG proposals will not interfere with their implementation.
	C-36: Develop a program consistent with all existing licenses, permits, and agreements affecting the River	The program should adhere to all California Environmental Quality Act and the National Environmental Policy Act (CEQA/NEPA) regulations.

TABLE 2: MOKEWISE PROGRAM CONSEQUENCES TO BE AVOIDED

CATEGORY	CONSEQUENCE TO BE AVOIDED	SUMMARY
Data	CA-37: Avoid basing decisions on incomplete or inaccurate information	The program should avoid decision-making based on incomplete or inaccurate information.
Environment	CA-38: Avoid demand for new or larger on-stream dams	The program should avoid demand for new or larger on-stream dams.
	CA-39: Avoid harmful impacts to fisheries and other wildlife	The program should avoid harming fisheries and other aquatic and terrestrial wildlife.
	CA-40: Avoid conversion of agricultural lands to developed uses	The program should avoid urbanization of agricultural lands.
	CA-41: Avoid shifting environmental impacts from one area to another	The program should avoid shifting environmental impacts from one sensitive area to another.
	CA-42: No diminishment of the benefits of existing in-stream flow	The program should protect against any decrease in benefits to public trust resources of existing in-stream flows.
Collaboration	CA-43: Avoid closing the process to the public	The program should avoid closing the process to the public.
Other Human Values	CA-44: Avoid dependency on potentially unreliable supply	The program should support projects and policies that will prevent downstream users from becoming dependent on unreliable supplies
	CA-45: Minimize adverse socio-economic and public health and safety impacts	The program should promote projects and policies that limit or appropriately mitigate adverse socio-economic and public health and safety impacts.
	CA-46: Avoid end use harm	The program should seek to allocate water in ways that do the least end use harm.
	CA-47: Avoid violating procedural or substantive laws.	The program should commit to completing CEQA/NEPA analysis prior to the agencies adopting and implementing the program.
	CA-48: Avoid interregional inequity	The program should provide parity or equity among the regions.

4 WATERSHED CONDITIONS

Watershed Conditions

In an effort to establish a common understanding of baseline conditions in the Mokelumne River watershed, the MCG directed development of three documents related to the watershed, its current conditions, and water availability. The Baseline Environmental Conditions report highlights current watershed conditions, explores interactions between flow, sediment, geomorphology, and ecological water needs, and discusses geomorphic and fisheries related opportunities, challenges, and trade-offs. This report, included as **Appendix F**, provided the MCG with an initial background on watershed environmental conditions, including the geomorphic work and fisheries benefits provided by the watershed and the Mokelumne River. The Water Availability Analysis, included as **Appendix G**, quantified potentially available supply from a variety of sources, including the Mokelumne River, other surface water, groundwater, recycled water, stormwater, agricultural drainage water, desalination, and conservation. The Climate Change Memorandum summarizes information developed by groups in the upper and lower watersheds related to climate change vulnerabilities and strategies for addressing these vulnerabilities. This memorandum is included as **Appendix H**. Each of these three documents, discussed in further detail below, was approved by the MCG to define baseline conditions as a starting point for identifying opportunities and constraints for water management project concepts in the watershed (see **Section 5** for more information about the project concepts).

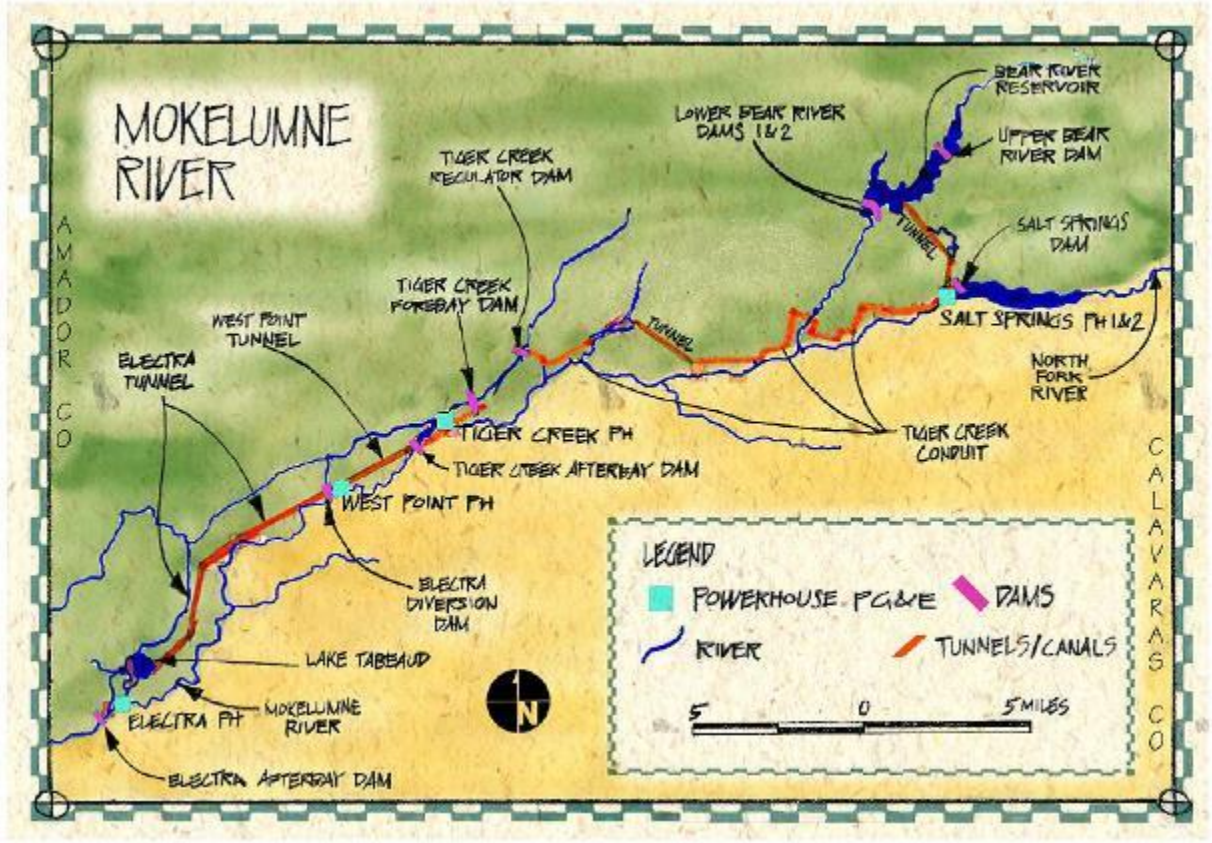
BASELINE ENVIRONMENTAL CONDITIONS

The Mokelumne River drains about 627 square miles in the central Sierra Nevada. Mean precipitation in the watershed during 1981-2001 was 48 inches, with a range of 23-65 inches depending on geographic location (Null and others, 2010). In the Mediterranean-montane climate, most precipitation occurs October through May and generally falls as snow above about 3,000 to 5,000 feet in elevation, depending on temperature. As with all other Sierran watersheds, the flow regime of the Mokelumne River is highly dependent on annual snowpack.

The natural flow regime for the Mokelumne River has been highly altered by existing projects, including 13 impoundments that each hold greater than one thousand acre-feet (TAF) of water (Null and others, 2010) (see **Figure 2**). The facilities that support this degree of water management have dramatically altered natural flows. On the other hand, the flow schedule for Pacific Gas and Electric (PG&E) facilities was designed to mimic the natural hydrograph both in seasonal magnitude and in ramping rates, and to provide hydropower and water to around 1.5 million California residents. Other significant alterations to the natural environment include gold mining, gravel extraction, logging, channelization, and

conversion of floodplains and riparian corridors to agricultural fields via shallow floodplain lake infill, channel cutoff, and levee building (Kattelmann, 1996).

Figure 2: PG&E Projects on the Upper Mokelumne River



Source: EDF and CHRC, 2000. Modified.

Pardee and Camanche Dams, both owned and operated by EBMUD serve as the boundary between the upper and lower watersheds. The storage volume, landscape position, and dam operations at Pardee and Camanche Dams are highly disruptive to the geomorphic continuity of the Mokelumne River watershed. Functions that are disrupted include flow magnitude, frequency, duration, timing and rate of change, which as a group are defined as flow attenuation features that can alter ecological and geomorphic processes (Poff and others, 1997).

Pardee Dam was completed in 1929. EBMUD has the right to divert 325 million gallons of water per day (mgd) from this facility to Alameda and Contra Costa Counties (EBMUD,

2013). Camanche Dam was completed in 1964 to provide flood control and to help meet downstream water demands. A large proportion of the available water is stored and later released to the Mokelumne River, while larger organic materials (biological sediments) and inorganic sediments are mostly captured within the reservoirs. This watershed-scale discontinuity prevents the natural flow regime from maintaining the geomorphic and ecological integrity of the watershed.

Although the Mokelumne River and its waters provide for consumptive water use, more water is often desired than is available from surface water alone. Agriculture and other developments have come to depend on groundwater as a reliable supplemental water source. Prior to development, groundwater generally infiltrated into the subsurface and moved from uplands areas to lowland areas further downstream. Below Camanche Dam, the Mokelumne River tends to be a losing stream (i.e., one in which surface water infiltrates into the groundwater system through the channel bed rather than groundwater filtering up into the wetted channel).

On the Mokelumne River, all of the dams and reservoirs in the upper and lower watershed create sediment and flow discontinuities within the channel network. The large dams and reservoir systems of Pardee and Camanche Dams diminish flow and sediment between the upper and lower watershed. The watershed issues that arise from the discontinuity of sediments and water are fundamentally linked to the overall geomorphic health of the river-hillslope-floodplain ecosystem.

The Mokelumne River supports a diverse assemblage of resident and migratory fish species. Resident rainbow trout and other native fish inhabit the upper basin watershed. While impoundments such as Camanche and Pardee reservoirs prevent sediment from traveling downstream, they also provide habitat for a number of native and introduced fish species, including largemouth bass that support recreational fisheries. The Mokelumne River downstream of Camanche Dam supports a diverse assemblage of resident and migratory fish species including fall-run Chinook salmon and steelhead, which - prior to construction of the river's dams - continued where they spawned upstream in the upper watershed. Changes in geomorphic function can lead to loss of habitat or populations of fish or amphibians.

Adaptive management of limited water supplies can be and has been used as a management tool for improving habitat conditions (e.g., providing pulse flows in the fall for adult Chinook salmon upstream attraction and migration and flows related to instream conditions for Foothill Yellow-Legged Frogs in the upper watershed). Challenges exist in providing more reliable habitat conditions over a range of hydrologic conditions as well as meeting institutional and regulatory needs for a variety of beneficial uses.

WATER AVAILABILITY

In order to develop effective water resource management projects that could benefit both regions, there is a need to identify and quantify water currently flowing in the Mokelumne River. The Water Availability Analysis determined the quantity of water expected to be present in the river at multiple locations under historical hydrological conditions, as well as water potentially available for use in a MokeWISE project from a variety of sources, including groundwater, agricultural drainage, stormwater, recycled water, conservation, desalination, the Mokelumne River, and other surface water. These sources were investigated over the 30 year planning horizon from 2010 to 2040 for their potential to provide supply to a new project in the upper and/or lower Mokelumne watershed.

The Water Availability Analysis was performed at a feasibility level as part of the MokeWISE Program. It was not designed, nor was it intended to, serve as the basis for a water rights proceeding. Any future water rights application must undergo a separate water availability analysis. The following sections summarize the findings of the Water Availability Analysis, which is provided in **Appendix G**.

Groundwater

Aside from the groundwater currently used and planned for use, groundwater was not considered a viable additional water supply in the upper watershed for a MokeWISE project primarily due to limited potential yield. Based on water age findings, large-scale natural groundwater recharge was found unlikely to be viable in the Calaveras County portion of Eastern San Joaquin subbasin. Total agricultural and municipal groundwater pumping in Eastern San Joaquin County is estimated to have averaged 870,000 AFY since the 1970s, which has contributed to overdraft conditions. The groundwater basin is currently overdrafted at a rate of 70,000 to 80,000 AFY (GBA 2014). Continuing these rates of extraction will further impact groundwater levels, and saline groundwater will continue to migrate east into the basin (GBA 2004). This will continue to impact the availability of groundwater in the future. Conjunctive management strategies (i.e., management of groundwater and surface water resources) and groundwater recharge opportunities may help to mitigate groundwater overdraft conditions.

Agricultural Drainage Water

Agricultural drainage water was assumed to be decreasing. In addition, use of agricultural drainage has the potential to pose challenges for downstream water users. In many cases, downstream users divert agricultural drainage water that was discharged by upstream users. As agricultural efficiencies are realized, this source is naturally decreasing, while potentially increasing the concentrations of contaminants. Capture and reuse of agricultural drainage water was not considered a viable alternative for a MokeWISE project because

such use would further decrease this source for downstream users, thereby potentially decreasing the supplies available for downstream water users and groundwater users.

Recycled Water

Potentially available recycled water was determined by quantifying treated wastewater within the watershed and the volume of recycled water that is currently used or planned for future use. The difference between these two amounts, after considering constraints, was considered potentially available for reuse.

Recycled water potentially available for a MokeWISE project was estimated to be 222,500 acre-feet per year (AFY). However, due to constraints and challenges associated with treating and delivering recycled water, the total potentially available supply decreased to approximately 169,400 AFY. This includes an estimated 126,720 AFY in secondary treated recycled water and roughly 42,680 AFY in tertiary treated recycled water available. Future recycled water opportunities within the upper and lower watersheds accounts for roughly 6,500 AFY of the total recycled water potentially available, while the remaining approximately 162,900 AFY is generated in the EBMUD retail service area. It is anticipated that social and economic issues will delay reuse of much of the potentially available supply. There are also sensitivities surrounding the use of recycled water outside the area of origin.

Stormwater

In order to identify the potential supply available from stormwater capture, the amount of stormwater runoff that is not captured or infiltrated was estimated. For residential areas in the upper and lower watersheds, this was estimated by identifying impervious areas and estimating the average annual rainfall and snowmelt in those areas and assuming that some residential homes would participate in a rain barrel program. On a large-scale, stormwater from the municipal systems in Lodi and Stockton was estimated; it was assumed that municipal systems in the upper watershed would not contribute a substantial amount of stormwater for the MokeWISE program. As a final step, large-scale and small-scale stormwater capture programs were evaluated and existing stormwater programs in the MAC and ESJ regions were reviewed.

Total stormwater potentially available for reuse within the region from residential and municipal sources was estimated to be roughly 15,100 AFY. Stormwater that could potentially be captured and reused within residential areas was estimated to be 640 AFY. Stormwater capture from municipal systems was estimated to be 14,920 AFY. Residential areas within the upper watershed could potentially capture up to 90 AFY, while residential areas in the lower watershed could potentially capture 550 AFY, assuming rainwater capture occurs all year long. The cities of Stockton and Lodi discharge approximately 11,370 AFY

and 3,550 AFY of stormwater within their municipal systems, respectively. These amounts could potentially be captured and reused.

Conservation and Efficiency

The amount of supply potentially available through conservation was determined by quantifying water that could be conserved through the expansion of conservation programs within the MokeWISE region, after accounting for those measures that are currently being implemented or are planned for implementation. Conservation programs considered included plumbing retrofits, landscape conversions, public outreach programs, and leak detection programs. Two levels of conservation savings were calculated. One assumed that current program levels doubled and the second assumed 85 gallons per capita per day (gpcd). **Table 3** provides a summary of the potential future water savings.

TABLE 3: POTENTIAL ADDITIONAL FUTURE SUPPLY AVAILABLE THROUGH EXPANDED CONSERVATION PROGRAMS*

AGENCY	TOTAL SAVINGS ACHIEVABLE (AFY) UNDER EXPANDED PROGRAM	TOTAL SAVINGS ACHIEVABLE (AFY) UNDER THEORETICAL MAXIMUM (85 GPCD)
AWA	44.9 – 97.2	4,030.7
CCWD	1,385.0 – 1,485.4	5,106.9
CPUD	Not quantified	1,077.1
JVID	212.5	Not quantified
City of Stockton	587.7 – 1,671.3	23,508.2
City of Lodi	301.6 – 603.5	10,945.0
WID	Not quantified	Not quantified
NSJWCD	Not quantified	Not quantified
EBMUD	--	135,263.0
Agricultural	170,826	170,826.0**
Total	173,357.7 – 174,895.9	350,756.9

* The numbers presented do not include Best Management Practices (BMPs) that could not be quantified due to limited available data.

** This figure does not reflect 85 gpcd. It is assumed here that this agricultural program would be implemented in both the expanded program scenario and the theoretical maximum program scenario.

Desalination and Demineralization

Because groundwater within the Eastern San Joaquin Groundwater Basin is considered "critically overdrafted," groundwater demineralization was not considered a viable supply. While small-scale, local opportunities may exist, additional withdrawal from the

groundwater basin would likely exacerbate the groundwater conditions. As such, groundwater demineralization was not anticipated to provide a long-term, regional supply for a new MokeWISE project.

While the Mokelumne River watershed is not located near a source for desalination, desalination exchange could potentially be a viable water supply in the future through a program such as the Bay Area Regional Desalination Program (BARDP). Currently, however, the BARDRP is designed to meet the needs of all current partners; any additional partners would require a modification of the design capacity. As such, desalination exchange was not considered a viable supply alternative.

Mokelumne River

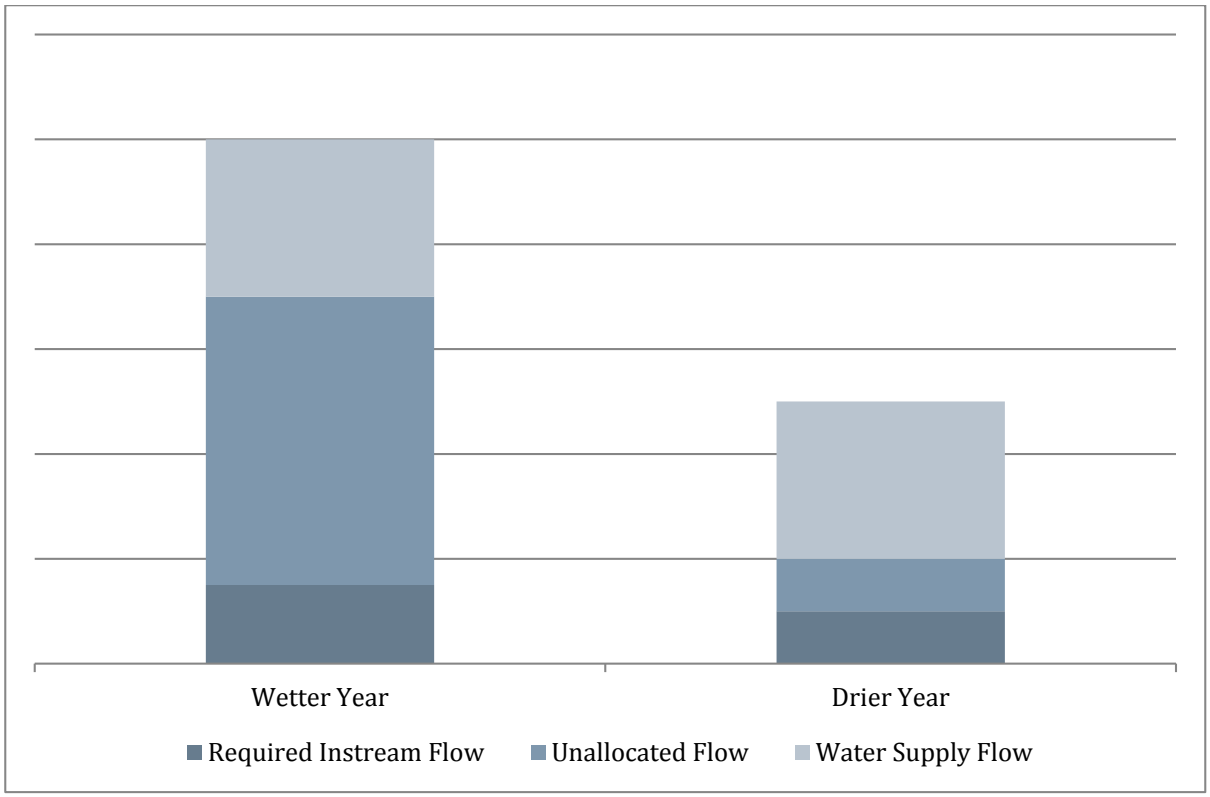
MCG members were tasked with developing a definition of "available water" for Mokelumne River supply. The MCG assembled a Modeling Workgroup (a subset of the MCG), tasked with developing a mutually agreeable definition of available water. Based on recommendations from the Modeling Workgroup, the MCG ultimately decided to quantify "unallocated water" within the Mokelumne River in lieu of defining "available water," because the definition of "available" is heavily dependent on one's perspective and value assigned to various existing uses. Unallocated water, as it is used within MokeWISE, was defined as that quantity of water in the Mokelumne River that is not diverted pursuant to a riparian, pre-1914, or appropriative water right and that is not explicitly required to be in the river pursuant to a prescribed regulatory requirement[1].

Unallocated water was simulated using the Mokelumne-Calaveras Simulation Model (MOCASIM), which simulates in-river flow conditions over the period of record (1953-2010) under specific diversion assumptions representative of the years 2010 and 2040 (referred to as the 2010 and 2040 baselines, respectively). Channel losses and instream flows required by the Federal Energy Regulatory Commission (FERC) requirements for Project 137, Lodi Decrees and Joint Settlement Agreement (JSA) are automatically accounted for by the model logic based on hydrologic and storage conditions. Diversions are included as a primary input to the model. **Figure 3** illustrates the three major components that generally make up Mokelumne River supply.

[1] The Modeling Workgroup agreed to look at various ways of defining "available water" in the Mokelumne River in the context of specific projects, particularly projects relating to groundwater recharge in San Joaquin County. However, such recharge projects were not sufficiently defined by the County to allow for this analysis during MokeWISE. The County and interested stakeholders plan to complete this analysis during the implementation of Project 4a ("Groundwater Banking within the Eastern San Joaquin Groundwater Basin").

To help facilitate the modeling effort, review preliminary simulation results, and make modeling-related recommendations to the MCG, a Modeling Workgroup was formed. The workgroup consisted of MCG members with a general interest in and understanding of modeling and its principles. The Modeling Workgroup met seven times in person and by telephone to review the MOCASIM model, discuss inputs, and review results. All decisions made by the Modeling Workgroup were brought back to the MCG for approval prior to implementation.

Figure 3: Mokelumne River Flow Components*



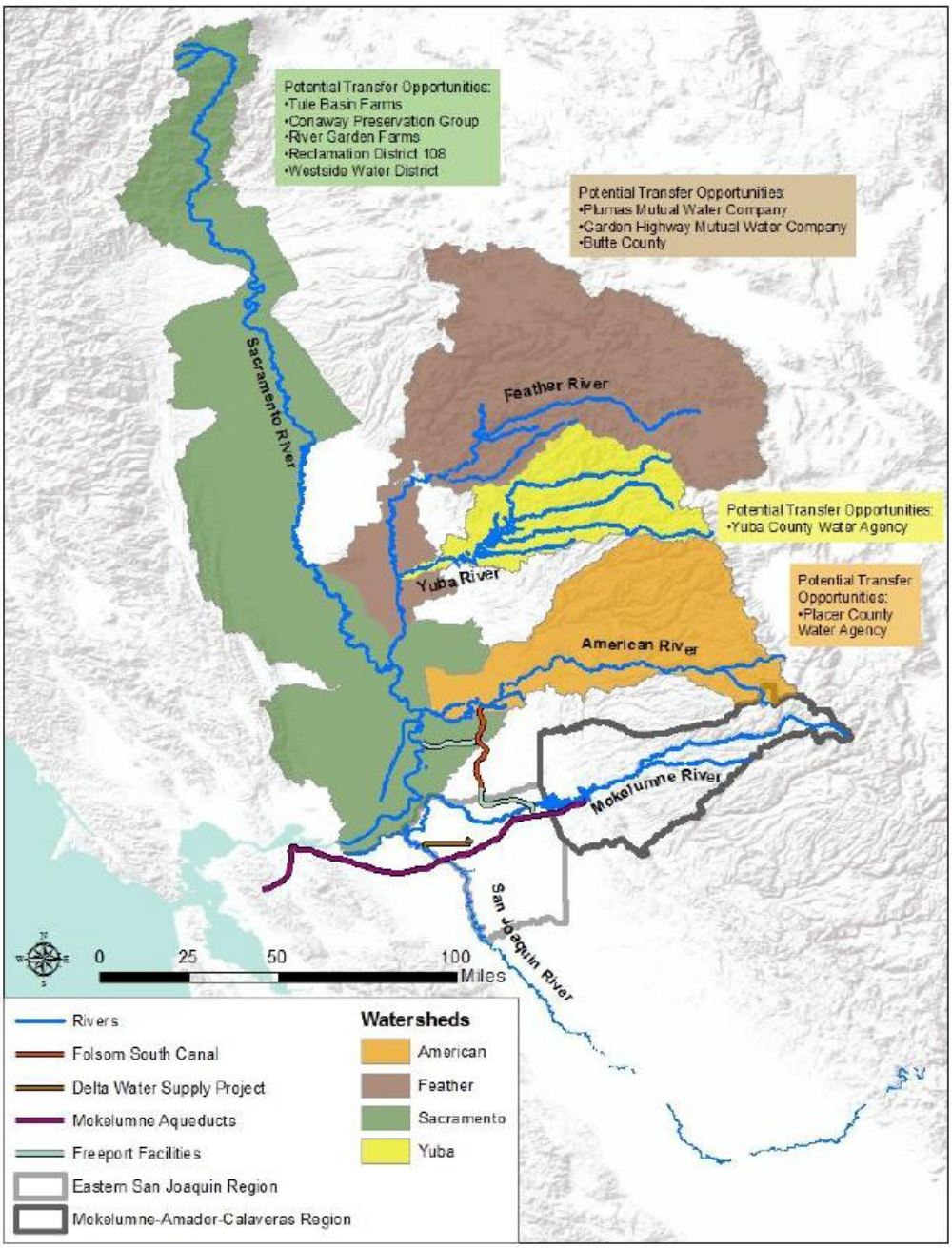
* This figure is provided as an example to show components of Mokelumne River flow and does not represent actual modeling results.

The amount of unallocated Mokelumne River water was found to be highly variable depending on demand/diversion assumptions, location along the River, and simulated hydrologic year type. Generally, there was more unallocated water present in the river further downstream and there was generally more unallocated water in the river in wetter than in drier years. Additionally, under both the 2010 and 2040 base case, more water was being released than is required as part of the JSA. There was also generally less unallocated water under the 2040 baseline condition than in the 2010 baseline condition, due to the assumed increases in diversions in the 2040 baseline condition.

Other Surface Water

Other (non-Mokelumne River) surface water potentially available for use in a MokeWISE project was estimated based on a review of transfers tracked by the State Water Resources Control Board (SWRCB) from 2012 to 2014, combined with information on known, recent water exchanges (**Figure 4)**. Of the data reviewed, the greatest quantity of water transfers occurred in 2014, totaling nearly 412,000 acre-feet (AF) in that year.

Figure 4: Examples of Recent Water Transfers in Relation to the MAC and ESJ Regions



In order for the region to utilize a water transfer to supply a MokeWISE project, conveyance infrastructure would be needed to convey the supply to the region. One option for conveying transfer supplies could be the use of EBMUD's Freeport facilities. Freeport facilities can convey roughly 185 MGD, with Sacramento County Water Agency (SCWA) receiving 85 MGD in all years and EBMUD receiving 100 MGD in dry years only (San Joaquin County

2009, ES-1). In normal and wet years, if EBMUD's 100 MGD were used, approximately 112,000 AFY of conveyance capacity would be potentially available for use by a MokeWISE program. As such, the potentially available supply from other surface water was assumed to be limited to the conveyance capacity of Freeport facilities.

Summary of Potentially Available Supply

Estimated quantities of supplies potentially available from each of the sources considered, including groundwater, agricultural drainage water, recycled water, stormwater, conservation, desalination, Mokelumne River, and other surface water, are summarized below and in **Table 4**.

Groundwater

- While currently used in the upper watershed, groundwater is not considered a viable additional source in Amador and Calaveras counties due to low yield, unreliability, age of groundwater, and limited storage opportunities.
- The Eastern San Joaquin Groundwater Basin is considered critically overdrafted.
- Groundwater is not considered a viable additional supply source, although conjunctive use and recharge opportunities may be available.

Agricultural Drainage Water

- While quantities of agricultural drainage water are unknown, it is assumed that they are currently minimal and decreasing due to investments in agricultural irrigation efficiency practices and technologies. As such, this is not considered a viable source.
- Some local, small-scale applications may be viable for capturing agricultural drainage, but it is not expected to provide a viable regional water supply.
- It is generally accepted that there is usually a user that will take agricultural drainage water downstream for use.

Recycled Water

- The total quantity of potentially available recycled water is estimated to be 222,500 AFY; however, that amount is reduced to roughly 169,400 AFY after accounting for challenges and constraints associated with the treatment and distribution of recycled water.
- Potential recycled water available in the future within the upper watershed, lower watershed, and EBMUD service area is estimated to be 3,489 AFY, 3,050 AFY, and 162,857 AFY, respectively. However, full use of this supply is not currently deemed realistic due to costs associated with infrastructure and coordinating with partner

agencies. Additionally, the total demand for the recycled water may limit how much can be used.

- Of the up to 169,400 AFY potentially available, an estimated 126,720 AFY of secondary treated and 42,680 AFY of tertiary treated recycled water is available in the future.

Stormwater

- Total potentially available stormwater within the MokeWISE region is between 14,939 AFY and 15,560 AFY. This amount includes the municipal systems in Lodi and Stockton and the residential areas in both the upper and lower watersheds.
- The municipal system in Lodi could potentially yield 3,550 AFY and the system in Stockton could potentially yield 11,370 AFY, totaling 14,920 from municipal systems.
- Residential areas in the MokeWISE region could potentially yield an estimated 20 AFY, with 3 AFY from the upper watershed and 17 AFY from the lower watershed, assuming rainfall capture occurred from April to October. If rainfall capture occurred all year long, the upper watershed could capture 90 AFY and the lower watershed could capture roughly 550 AFY.

Conservation

- Using water savings assumptions from the California Urban Water Conservation Council (CUWCC) and the applicable agencies, the estimated quantity of water that could potentially be available in the future under expanded implementation of BMPs is between 173,000 and 175,000 AFY. This number is assumed to be low, as the savings for several BMPs were unable to be determined due to data gaps.
- Under a theoretical maximum conservation program where agencies could reduce to 85 gpcd, anticipated future savings in 2040 would be roughly 350,000 AFY.
- Agricultural efficiency could potentially conserve roughly 170,000 AFY by 2030.

Desalination

- Groundwater demineralization requires additional withdrawal from the groundwater basin, which could exacerbate the existing overdraft condition.
- While desalination exchange could potentially yield available water in the future, the BARDP as currently sized is designed to meet the needs of all current partners. Additional partners would require a modification of the design capacity.
- At this time, neither groundwater demineralization nor desalination exchange are considered viable supplies.

Mokelumne River

- Supply of unallocated water is highly variable based on year type and River location.

- Generally, there is more unallocated water in wet and above normal years than in below normal, dry, and critically dry years.
- Modeling indicates that under both 2010 and 2040 baselines, more water is being released at both JSA compliance points than is required as part of the JSA.

Other Surface Water

- The total estimated quantity of short-term transfers available is 85,325 AFY, while long-term transfers potentially provide an additional 127,261 AFY. However, more information on availability under various seasonal conditions and year types is needed to refine this estimate.
- Other surface water may include unappropriated flood flows or water that may potentially be available under a new flow regime. These quantities, while variable and difficult to determine, may potentially provide additional available water to the MokeWISE program.

TABLE 4: POTENTIALLY AVAILABLE SUPPLIES

SUPPLY TYPE	TYPE OF SUPPLY AVAILABLE	AMOUNT OF SUPPLY AVAILABLE (AFY)	CHALLENGES	OPPORTUNITIES
Groundwater	N/A	Not quantified	• Availability • Groundwater basin conditions	• Direct/in-lieu banking • Direct injection
Agricultural Drainage Water	N/A	Not quantified	• Downstream impacts • Treatment	• Soil flushing
Recycled Water	Secondary treated Tertiary treated	169,499	• Timing and storage • Economic feasibility • Coordination costs • Infrastructure requirements • Benefit allocation • Market potential • Local considerations • Scalability • Groundwater basin proximity • Downstream impacts	• Non-potable uses • Saline intrusion barrier • Indirect potable reuse/direct potable reuse • Direct injection
Stormwater	Municipal Residential	14,939	• Storage and timing of demand • Downstream impacts • Rain barrel requirements • Treatment and conveyances for large-scale systems • Groundwater recharge	• Large-scale detention basins • Low impact development (LID) • Land purchases • Formal on-site reuse programs • Offset surface water

TABLE 4: POTENTIALLY AVAILABLE SUPPLIES

SUPPLY TYPE	TYPE OF SUPPLY AVAILABLE	AMOUNT OF SUPPLY AVAILABLE (AFY)	CHALLENGES	OPPORTUNITIES
Conservation	Municipal Agricultural	173,357.7 – 350,756.9	• Downstream impacts • Growth impacts • Economic feasibility	• Further implementation of BMPs • Implementation of additional BMPs • Infrastructure improvements • Altering rate structures
Desalination	Groundwater demineralization Desalination exchange	Not quantified	• Institutional challenges • Groundwater basin conditions • Waste stream	• Use of saline supplies • Solar desalination
Mokelumne River	Unallocated water	Variable*	• Balancing competing interests • Variable flow • New diversions • Banking • Infrastructure requirements • Economic feasibility • Ecosystem/wildlife harm	• Supply source for direct/in-lieu banking • Ecosystem/wildlife benefits
Other Surface Water	Short-term transfers Long-term transfers Unappropriated Delta water	212,585**	• Downstream impacts • Growth impacts • Economic feasibility • Infrastructure requirements	• Further implementation of BMPs • Implementation of additional BMPs • Infrastructure improvements • Altering rate structures

* Dependent on year type and location on the Mokelumne River.

** Dependent on flood flows, hydrologic year type, and/or amount of water in Delta.

CLIMATE CHANGE VULNERABILITY

The State of California, along with scientific organizations, including the International Panel on Climate Change (IPCC), have documented changes in both global and local climate over the past 100 years and anticipate even more changes in air temperature, precipitation, and mean sea levels in the coming decades. In California, warming temperatures are expected to raise the snowfall elevation, causing more winter precipitation in the Sierra Nevada to occur as rainfall. As a result of these changes, several million acre-feet (MAF) of natural snowpack storage could be lost annually, reducing available water supply. In addition, the increasing severity of storms and increased runoff could overwhelm existing reservoir flood protection capacity and increase flood risks downstream. Rising sea levels may increase the scope of saltwater intrusion challenges in the Delta.

An analysis using a rainfall-runoff model has been used to better understand how individual watersheds might be affected with changes in runoff quantity and timing due to climate warming (Null et al. 2010). The Mokelumne River watershed was found to be most vulnerable to a combination of the three metrics that were studied: water supply, hydropower generation, and montane ecosystems. This result may indicate that the Mokelumne River watershed is less resilient to climate change than some of the other Sierran watersheds.

Planning for these changes is necessary in order to ensure a reliable water supply, maintain water quality, protect against flooding, and protect and restore ecosystems and habitat. Climate change will likely affect the upper and lower watersheds differently. As such, a review of climate change information developed by the MAC and ESJ IRWM Regions and related subsequent publications was conducted to determine how climate change may impact the upper and lower watersheds. **Table 5** shows the climate change vulnerabilities by region, including those that are shared by both regions.

The MAC Region's highest priority vulnerabilities are water supply, water quality, ecosystem and habitat, increased water demand to fight wildfires, and hydropower. The ESJ Region's highest priority vulnerabilities include water reserve storage and management, water demand uncertainty, water quality and saline intrusion, and flooding and water logging in agricultural areas.

TABLE 5: CLIMATE CHANGE VULNERABILITIES BY IRWM REGION

	VULNERABILITY	MAC REGION	ESJ REGION	BOTH REGIONS
Water Demand	Increased water demand to fight increase in wildfires			✓
	Increased demand for process cooling water for food processing industries with increased surface water temperatures			✓
	Increased domestic demands with increased evapotranspiration			✓
	Increased agricultural demands due to longer growing season, increased temperatures and evapotranspiration, and more frequent/severe drought			✓
	Vulnerability of agricultural products to continued high temperature and changes to chilling hours (e.g., grapes for wine production, cherries)		✓	
	Harm to grapes vines and impacts to harvest due to excessive winter precipitation		✓	
	Increased power demands due to increased cooling needs in buildings		✓	
	Increased power demands at vineyards to use power operated cooling equipment		✓	
Water Supply	Decreased water supply due to decreased snowpack in the Sierra Nevada Mountains and shift in timing of seasonal runoff			✓
	Water table decline due to inadequate recharge		✓	
Water Quality	Reduced water quality due to saline water intrusion from sea-level and from lowered water tables/reduced streamflow		✓	
	Higher concentrations of surface and groundwater contaminants due to lower surface water flows and lower groundwater tables			✓

TABLE 5: CLIMATE CHANGE VULNERABILITIES BY IRWM REGION

	VULNERABILITY	MAC REGION	ESJ REGION	BOTH REGIONS
	Increased pesticide contamination to surface waters due to increased pesticide use (higher temperatures are more conducive to pests)			✓
	Reduced dissolved oxygen content due to increased surface water temperatures			✓
	Increased nutrient load to surface waters due to increase in wildfires			✓
	Increased nutrient loading due to increased urban and agricultural seasonal runoff		✓	
	Degraded surface and groundwater quality due to reduction of meadow area that can provide contaminant reduction	✓		
Flood Management	Increased flooding in low-lying areas due to sea level rise and sea water intrusion into Delta		✓	
	Increased flood inundation due to increased runoff in the winter and potentially fall			✓
	Increased seasonal flooding due to increases in seasonal precipitation during winter and fall			✓
	Increased flooding due to reduction of meadow area which help reduce floods in winter	✓		
Hydro-power	Reduced hydropower generation due to lower reservoir levels caused by increased customer demand and changes in timing of seasonal runoff/flasher storm systems			✓
Ecosystem and Habitat	Impacts to vegetation due to increased temperatures and evapotranspiration, changes in precipitation patterns and distribution, and more frequent/severe droughts and wildfires			✓
	Reduced quality of fish habitat due to reduced water quality, lower flows and warmer water temperatures			✓

TABLE 5: CLIMATE CHANGE VULNERABILITIES BY IRWM REGION

	VULNERABILITY	MAC REGION	ESJ REGION	BOTH REGIONS
	Hindered upward migration of anadromous fish due to low spring flow			✓
	Shift of freshwater-saltwater habitat due to lower summer stream flows		✓	
Sea Level Rise	Impacts to agricultural land in the Delta's reclaimed regions due to sea level rise		✓	
	Exacerbated saline intrusion to surface and groundwater		✓	
	Greater risk of levee overtopping or failure due to sea level rise		✓	

Identifying strategies that address the climate change vulnerabilities described above is a key step in adapting to climate change as well as mitigating greenhouse gas emissions. The MAC Region and the ESJ Region each identified Resource Management Strategies (RMS) from the 2009 California Water Plan (CWP) Update that would help them to meet their water resource management objectives, including identifying RMS that could address the Regions' climate change vulnerabilities. In addition, the RMS were evaluated for their ability to potentially reduce greenhouse gas (GHG) emissions and mitigate climate change impacts of the energy needed to treat and distribute water.

Since selection of these strategies, the 2013 CWP Update was published. The following 10 "Essential Actions" are from the California Water Action Plan (CWAP) released by the California Governor in 2014, which align with the CWP. These essential actions are considered priorities for the State of California.

- Make Conservation a California way of life
- Invest in integrated water management and increase regional self-reliance
- Achieve the coequal goals for the Delta
- Protect and restore important ecosystems
- Manage and prepare for dry periods
- Expand water storage capacity and improve groundwater management
- Provide safe drinking water and secure wastewater systems to all communities
- Increase flood protection
- Improve operational and regulatory efficiency
- Identify sustainable and integrated financing

Within these Essential Actions there are 17 objectives:

- Strengthen Integrated Regional Water Management Planning
- Use and Reuse Water More Efficiently
- Expand Conjunctive Management of Multiple Supplies (groundwater & surface storage)
- Protect and Restore Surface Water and Groundwater Quality
- Practice Environmental Stewardship
- Improve Flood Management Using an Integrated Water Management
- Manage the Delta to Achieve the Coequal Goals for California
- Prepare Prevention, Response, and Recovery Plans
- Reduce the Carbon Footprint of Water Systems and Water Uses
- Improve Data, Analysis, and Decision-Support Tools
- Invest in Water Technology and Science

- Strengthen Tribal/State Relations and Natural Resources Management
- Ensure Equitable Distribution of Benefits
- Public Access to Waterways, Lakes, and Beaches
- Strengthen Alignment of Land Use Planning and Integrated Water Management
- Strengthen Alignment of Government Process and Tools
- Improve Integrated Water Management Finance Strategy and Investments

There are more than 300 specific actions in Update 2013, Vol. 1, Ch. 8, "Roadmap for Action" and Vol. 3, "Resource Management Strategies (RMS)." The strategies in the 2013 CWP Update are largely the same as those listed in the 2009 CWP Update, but with some additional strategies added including sediment management, outreach and engagement, and water and culture. The 2013 CWP Update strategies will be considered in detail in the next update of each regions' IRWM Plans.

RMS selected for inclusion in the MAC and ESJ Regions' Plans, the climate change vulnerabilities they help to address, and their contribution to GHG emissions mitigation in the Regions are shown in

TABLE 6: RMS THAT ADDRESS CLIMATE CHANGE VULNERABILITIES

The categories identified in this table correspond to the major areas identified in the CWP Update. Note that these RMS, defined in the 2009 CWP Update, were identified as relevant in the respective IRWM Plans, and reference in the MokeWISE program does not reflect endorsement of the strategies by any or all MCG members.

TABLE 6: RMS THAT ADDRESS CLIMATE CHANGE VULNERABILITIES

	WATER DEMAND	WATER SUPPLY	WATER QUALITY	FLOOD MANAGEMENT	HYDROPOWER	ECOSYSTEM & HABITAT	SEA LEVEL RISE	ENERGY EFFICIENCY	EMISSIONS REDUCTION	CARBON SEQUESTRATION
REDUCE WATER DEMAND										
Agricultural Water Use Efficiency	✓	✓			✓	✓		✓	✓	
Urban Water Use Efficiency	✓	✓			✓	✓		✓	✓	
IMPROVE OPERATIONAL EFFICIENCY AND TRANSFERS										
Conveyance – Regional/Local		✓	✓	✓		✓		✓	✓	
System Reoperation		✓		✓	✓			✓	✓	
Water Transfers		✓						*	*	
INCREASE WATER SUPPLY										
Conjunctive Management and Groundwater Storage		✓	✓	✓		✓		*	*	
Precipitation Enhancement		✓			✓	✓		✓		
Recycled Municipal Water		✓				✓		*	*	
Surface Storage – Regional/Local		✓	✓	✓	✓	✓		*	✓	
IMPROVE WATER QUALITY										
Drinking Water Treatment and Distribution		✓	✓					✓	✓	
Groundwater Remediation/Aquifer Remediation		✓	✓					*	*	
Matching Quality to Use	✓	✓	✓			✓		*	*	
Pollution Prevention		✓	✓			✓			✓	
Salt and Salinity Management		✓	✓			✓			✓	
Urban Runoff Management			✓	✓		✓		✓	✓	

TABLE 6: RMS THAT ADDRESS CLIMATE CHANGE VULNERABILITIES

	WATER DEMAND	WATER SUPPLY	WATER QUALITY	FLOOD MANAGEMENT	HYDROPOWER	ECOSYSTEM & HABITAT	SEA LEVEL RISE	ENERGY EFFICIENCY	EMISSIONS REDUCTION	CARBON SEQUESTRATION
PRACTICE RESOURCE STEWARDSHIP										
Agricultural Lands Stewardship	✓		✓							✓
Economic Incentives	✓	✓	✓		✓		✓	✓	✓	✓
Ecosystem Restoration		✓	✓	✓	✓		✓			✓
Forest Management		✓	✓	✓	✓					✓
Land Use Planning and Management	✓	✓	✓	✓	✓		✓	✓	✓	✓
Recharge Area Protection		✓	✓	✓						✓
Water-dependent Recreation			✓	✓						✓
Watershed Management		✓	✓	✓	✓		✓	✓	✓	✓
IMPROVE FLOOD MANAGEMENT										
Flood Risk Management		✓	✓	✓	✓		✓			✓
OTHER STRATEGIES										
Irrigated Land Retirement	✓	✓	✓		✓			*	*	
Rain-fed Agriculture	✓	✓	✓		✓			✓	✓	

Strategies identified in the 2009 California Water Plan Update (Bulletin 160-09)

Key:

✓ Indicates that, in general, this will provide a beneficial effect

X Indicates that, in general, this will provide an adverse effect

* Indicates that this may provide either beneficial or adverse effects

5 PROGRAM DEVELOPMENT

Program Development

MokeWISE program development was guided by the MCG. Initial project concepts were proposed by individual MCG members. With the aid of the Baseline Environmental Conditions Technical Memorandum (see **Section 4**), the MCG then brainstormed project concepts and revised or expanded these concepts. Concepts were then preliminarily screened, assessed for their environmental benefits and impacts, and assessed against the MokeWISE program objectives and consequences to be avoided (see **Section 3**).

With the aid of the Water Availability Analysis (see **Section 4**), the MCG then determined which of the project concepts would move forward for further analysis. The Climate Change Memorandum (see **Section 4**) was used to confirm the climate change reduction and adaptation benefits of the project concepts. Those project concepts selected underwent scope development and further refinement to better characterize the project concept into an implementable project. Budgets for each project were also developed to support the scope level. From these further analyzed projects, the MCG selected which projects would move forward to be included in the MokeWISE Implementation Plan. The following list includes all projects included in the Implementation Plan.

MokeWISE Implementation Projects

- 1a: Re-Introduction of Fall-Run Chinook Salmon Upstream of Pardee Reservoir
- 1b: High Country Meadow Restoration Program
- 1c: Mokelumne River Day Use Area Floodplain Habitat Restoration Project
- 1d: Fish Screens for Riparian Diversions in the Lower Mokelumne
- 1f: Riparian Restoration Program – Below Camanche
- 1g: Mokelumne Water Quality, Soil Erosion, & Sedimentation Inventory/Monitoring
- 2a: Municipal Recycled Wastewater Recharge Program
- 2b: Constellation Winery Wastewater Reuse
- 2c: Amador County Regional Reuse
- 4a: Groundwater Banking within the Eastern San Joaquin Groundwater Basin
- 4b: Amador and Calaveras Counties Hydrologic Assessment
- 4d: NSJWCD Infrastructure Improvements
- 5a: Regional Urban Water Conservation Program
- 5b: Regional Agriculture Conservation Program*
- 7a: PG&E Storage Recovery
- 7b: Lower Bear Reservoir Feasibility Update and Preliminary Engineering
- 7d: Re-operation of Existing Storage

- 7f: Blue and Twin Lakes Dams Reliability and Replacement Assessment
- 8b: Rehab of Transmission Main
- 8c: Barney Way Septic System Conversion
- 8d: Lake Camanche Village Recycled Water Project

MokeWISE Policies and Initiatives

- 9a: Land Use Coordination
- 9b: Sustainable Forest - Watershed Management Project
- 9c: Watershed Coordinator
- 9f: MokeWISE Project Public Involvement Initiative

Implementation Plan projects are those that are generally supported by a cross section of Mokelumne River watershed stakeholders and may be more attractive for funding. The institutional structure charged with implementing MokeWISE will focus on seeking funding for projects within the Implementation Plan. The following sections further discuss program development, including how Implementation Plan projects were selected.

PROJECT CONCEPT DEVELOPMENT

To begin developing project concepts, MCG entities identified potential projects and project ideas, referred to as "concepts," that could provide water management, environmental, or other benefits to the region and be included in the MokeWISE program. Submitted project concepts ranged from preliminary thoughts or ideas for new projects to programs or management actions that were currently in planning stages and could move forward independently of the MokeWISE program. Information including a concept name, description, potential partners, and status was collected for each of the 60 concepts submitted. Those submitting concepts were also asked to indicate if the concept would address any of the MokeWISE program objectives or consequences to be avoided (**Section 3**).

Each submitted concept was added to a master concept list, which established a starting point for MCG discussion. MCG members reviewed concepts on the master list to determine potential synergies. In the subsequent months, a subgroup of the MCG met twice to review the concept list and identify questions or areas of clarification for each concept. Concepts and concept descriptions were further refined by the MCG based on information provided.

As a result of the MCG discussions, the master list was synthesized to 36 projects, which were grouped into 9 categories or project types (**Table 7** and **Figures 5 and 6**). These categories include Ecosystem and Habitat Restoration, Recycled Water, Desalination,

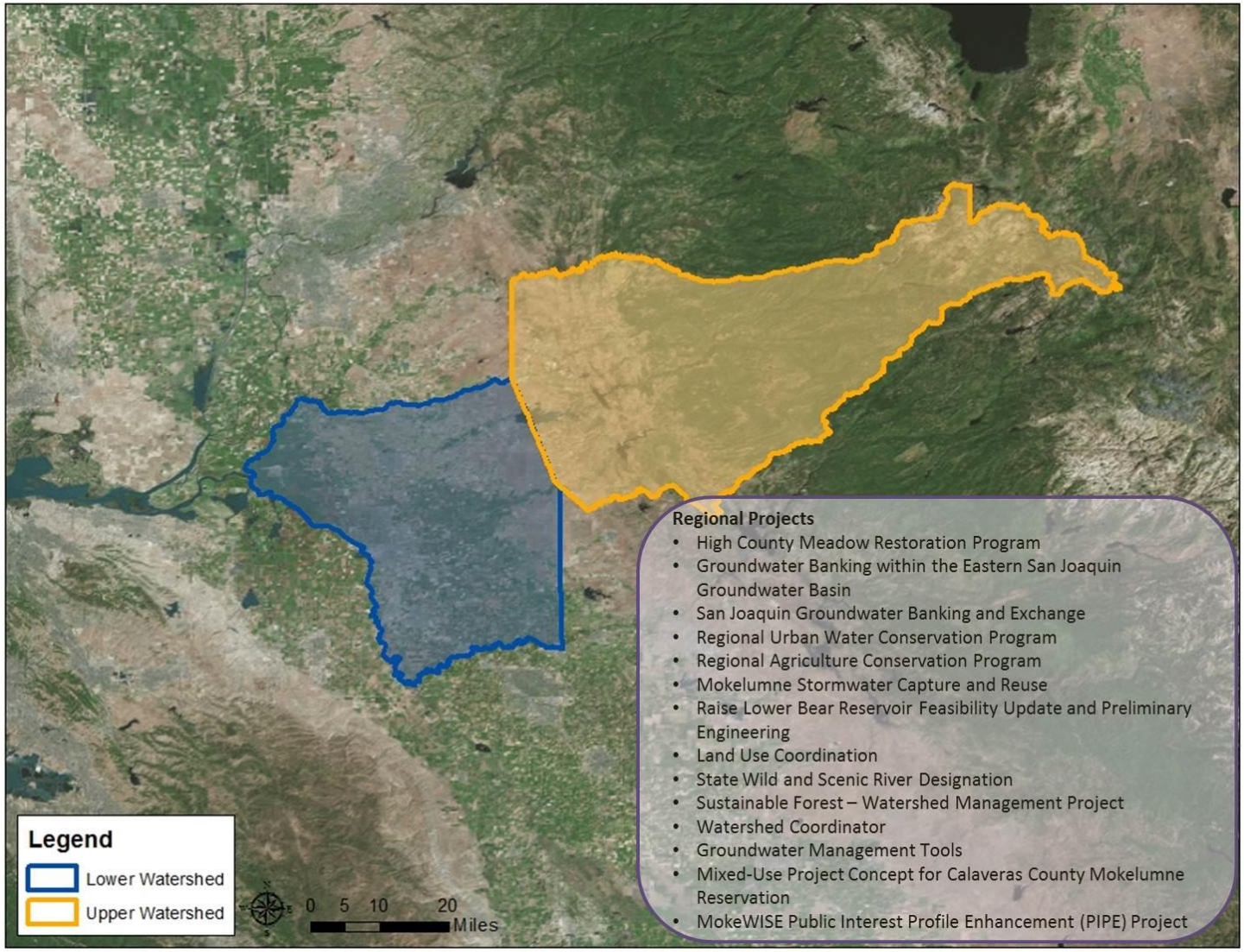
Groundwater Management, Water Conservation, Stormwater Management and Flood Control, Surface Water, Local Infrastructure, and Policies and Initiatives. The first eight categories were comprised of project concepts, while the Policies and Initiatives category included supportive policy statements and initiatives for implementation. The concept list is also included in **Appendix I**.

TABLE 7: REVISED MASTER PROJECT CONCEPT LIST
ECOSYSTEM AND HABITAT RESTORATION
Upper Mokelumne Anadromous Fish Restoration
High Country Meadow Restoration Program
Mokelumne River Day Use Area Floodplain Habitat Restoration Project
Fish Screens for Riparian Diversions in the Lower Mokelumne
Riparian Restoration Program – Upstream of Pardee Reservoir
Riparian Restoration Program – Below Camanche Reservoir
RECYCLED WATER
Municipal Recycled Wastewater Recharge Program
Constellation Winery Wastewater Reuse
Amador County Regional Reuse
Mokelumne Hill Sanitary District (MHSD) Reclaimed Wastewater
DESALINATION
Solar-Powered Desalination Study
GROUNDWATER MANAGEMENT
Groundwater Banking within the Eastern San Joaquin Groundwater Basin
Amador and Calaveras Counties Hydrologic Assessment
San Joaquin County Groundwater Banking and Exchange
North San Joaquin Water Conservation District Infrastructure Improvements
WATER CONSERVATION
Regional Urban Water Conservation Program
Amador Canal Conversion to Pipeline
Regional Agriculture Conservation Program
STORMWATER MANAGEMENT AND FLOOD CONTROL
Cosgrove Creek Flood Management Project
Mokelumne Stormwater Capture and Reuse
Mokelumne Floodplain Management Plan – Camanche to Below Woodbridge Dam
SURFACE STORAGE
PG&E Storage Recovery
Raise Lower Bear Reservoir Feasibility Update and Preliminary Engineering
Surface Storage Regional Assessment

Re-operation of Existing Storage
LOCAL INFRASTRUCTURE
Jeff Davis Water Treatment Plant Replacement
Rehab of Transmission Main
Barney Water Septic System Conversion
Lake Camanche Village Recycled Water Project
POLICIES & INITIATIVES
Land Use Coordination
State Wild and Scenic River Designation
Sustainable Forest – Watershed Management Project
Watershed Coordinator
Groundwater Management Tools
Mixed-Use Project Concept for Calaveras County Mokelumne Reservation
MokeWISE Public Interest Profile Enhancement (PIPE) Project

Figure 5: Upper and Lower Watershed Project Locations (from Revised Master Project Concept List)

Figure 6: Regional Project Locations (from Revised Master Project Concept List)



A project sponsor was identified as a champion or lead for each project concept. Project sponsors were asked to respond to requests for information, including estimated costs, potential funding sources, project location, and studies completed to-date. Sponsors were requested to provide quantitative information that could be used to assess the concepts and to identify whether and how the projects are consistent with MokeWISE program objectives and consequences to be avoided.

The results from the Water Availability Analysis also provided information used to further refine project concept descriptions. Information including potential yields and project locations was incorporated into relevant project concept descriptions. The information collected during the project development process was used to assess each of the 36 project concepts.

CONCEPT ASSESSMENT

Each project concept underwent three assessments. The assessment information was ultimately used by the MCG to determine whether or not a specific project concept would be included in the MokeWISE Implementation Plan. Project concepts were initially assessed to determine if they were feasible, beneficial, attainable, and compatible. Projects passing all four screens moved forward for further analysis. Those projects that did not were either revised to address the issue and comply with all four screening criteria, or were deemed to have a fatal flaw and were not moved forward. Projects passing this preliminary assessment were assessed based on their potential fishery and geomorphic benefits and impacts. This assessment did not result in any projects being removed from the process, but provided the MCG with information about the environmental merits of each project. The information provided in this environmental assessment was then incorporated into the third assessment. The third and final assessment incorporated the MokeWISE Program objectives and consequences to be avoided by assessing the project concepts against the objectives and consequences to be avoided. This assessment was used to determine the degree to which project concepts fulfilled program objectives and avoided negative consequences. Each of these three assessments is described below in further detail.

Preliminary Screening Assessment

The preliminary screening assessment was designed to identify and address "fatal flaws" associated with preliminary project concepts. Project concepts were qualitatively assessed against four screening criteria: feasible, beneficial, attainable, and compatible. The overarching purpose of this screening process was to address potential concept issues such that concepts which may not have universal support could be modified to be retained in the process longer to allow time and space for creative discussion about these concepts with the goal making changes that would allow broad support. Each criterion is described below.

- **Screen 1, Feasible:** Concepts were determined to pass the preliminary technical feasibility screen if the project concept, or similar projects/concepts, have been demonstrated to be technically feasible and no technical "fatal flaws" have been identified which would suggest the project may not be able to be implemented. The purpose of this screen was to remove concepts which were fatally flawed. This screen was not used to remove concepts which may not have had universal support.
- **Screen 2, Beneficial:** A project was determined to be beneficial if it achieved or helped to achieve one or more of the desired project outcomes established by the MCG (see **Section 3**). If a project or concept achieved one or more of the desired project outcomes and is therefore beneficial, it passed this screen.
- **Screen 3, Attainable:** If a project was reasonably expected based on engineering judgment to provide the benefits it proposed to achieve (Screen 2), it was preliminarily determined to be attainable and therefore passed this screen.
- **Screen 4, Compatible:** A project was determined to be compatible if it had no benefits or impacts that were contrary to the objectives, desired outcomes, and consequences to be avoided set forth by the MCG (see **Section 3**).

MCG members, after reviewing the initial screening assessment, provided comments and revisions were made where necessary and appropriate. Concepts were modified such that all concepts, as revised, passed all four screening criteria and were carried forward for further analysis. **Appendix J**, the MCG approved Project Assessment Memorandum, provides more information about this preliminary screening assessment. **Appendix K** includes the MCG approved results of the preliminary screening assessment.

Environmental Assessment

Revised project concepts, after passing the preliminary screening assessment, were assessed for environmental effects, including fishery and geomorphic benefits and impacts. Using the information collected during the project development process and past experience on similar projects, each concept was assessed on a scale from 1 to 5, with 1 indicating less potential benefit or greater potential impact and 5 indicating greater potential benefit or less potential impact. This assessment included a narrative explanation of anticipated feasibility, potential geomorphic benefit/impact, and potential fisheries benefit/impact. **Table 8** presents the general approach to the environmental assessment, including each of the categories against which the concepts were assessed. **Appendix L** includes the MCG approved Environmental Assessment for each of the screened concepts. Since the Policies and Initiatives are not actual projects and would generally not have quantifiable environmental benefits and/or impacts, they did not undergo this assessment.

TABLE 8: ENVIRONMENTAL ASSESSMENT APPROACH

CONCEPT NAME	FEASIBILITY	GEOMORPHIC BENEFIT	FISHERIES BENEFIT	ENVIRONMENTAL CONSIDERATIONS	GENERAL COMMENTS	POTENTIAL DIRECTION FOR CONCEPT DEVELOPMENT
Name	Benefit assessment (# from 1-5) Explanation of benefit assessment	Benefit assessment (# from 1-5) Explanation of benefit assessment	Benefit assessment (# from 1-5) Explanation of benefit assessment	Qualitative discussion of other environmental considerations of the project concept	General comments regarding the project concept	Discussion of potential areas for concept development, including areas that could help mitigate negative fishery or geomorphic impacts

Objectives Assessment

The objectives assessment involved assessing project concepts against the MokeWISE program objectives and consequences to be avoided (see **Section 3**). Using the information provided by project sponsors and included in the environmental assessment, each project concept was identified as fully addressing, partially addressing, or not addressing each of the MokeWISE program objectives and consequences to be avoided. These assessments were represented as a full moon, half-moon, or no moon, and an explanation was provided for each assessment. **Table 9** presents the general layout of the objectives assessment. **Appendix M** includes the MCG approved Objectives Assessment Project Concept Briefs. Since the Policies and Initiatives are not actual projects and would generally not provide quantifiable contributions to the program objectives or consequences to be avoided, they did not undergo this assessment.

TABLE 9: OBJECTIVES ASSESSMENT LAYOUT

OBJECTIVE	● ◗ ○	JUSTIFICATION
Objective Name	Moon (indicating degree to which project addresses objective)	Explanation for moon assessment

IDENTIFICATION OF CONCEPTS FOR FURTHER ANALYSIS

Following the various analyses conducted on the concepts, the MCG reviewed alternative ways of grouping projects for further development and evaluation. Initially, the MCG attempted to group projects into "portfolios," or project groupings, to assess opportunities for enhanced benefits through project synergies. However, because many of the project concepts are preliminary and information is qualitative in nature, assessing projects in groupings did not generate additional insights or identify any quantifiable synergistic effects. As such, the MCG opted to discuss and assess each project individually to determine whether or not it should be moved forward for further analysis.

The MCG reviewed each project concept to determine whether it would potentially provide a high value to the region and whether each MCG member could potentially "live with" the project – meaning it may have the potential to be modified to address any apparent issues that might prevent an MCG member entity from allowing it to move forward to implementation.

For each projects identified as potentially providing high value to the region and which each MCG member entity could potentially live with, an expanded project description, or

preliminary project scope of work, was developed to further refine the project and clarify outstanding questions and issues to enable MCG members to make decisions concerning support for or opposition to each project. Because so many project concepts are conceptual in nature, preliminary engineering could not be completed and the expanded descriptions were developed in lieu of preliminary engineering. In addition, many project concepts were converted into feasibility studies to help answer the outstanding questions critical to future support or opposition to the project itself. The preliminary descriptions were revised at length by the MCG until all outstanding points were clarified and each MCG member was in a position to determine whether or not their respective entity would ultimately be able to support the project or feasibility study. For a number of projects, workgroups consisting of a subset of MCG members were formed to review edits and work through outstanding issues. The MCG approved scopes are presented in **Appendix N**[2].

The descriptions of policies and initiatives were also expanded by the Policies and Initiatives Workgroup, a subgroup of the larger MCG. This workgroup met and held conference calls several times to discuss each policy and initiative, determine how best to develop or not develop each, and expand upon the preliminary conceptual descriptions. Once the workgroup reached consensus on a policy and initiative, the revised descriptions were reviewed and approved by the full MCG. The MCG-approved policies and initiatives are presented in **Appendix O**.

IMPLEMENTATION PLAN PROJECTS

The MCG identified a series of 21 projects for inclusion in the MokeWISE implementation plan, based on their potential value to the region and broad support among the MCG member agencies. Brief project summaries are provided on the following pages, and expanded project descriptions and scopes of work are included in **Appendix N**. As noted in the Implementation Plan (**Section 6**), implementation of these projects will depend on a variety of factors, including available funding.

In addition to identifying broadly-supported projects, the MCG identified a series of Policies and Initiatives with broad support which should be furthered as part of program implementation. MokeWISE Policies and Initiatives are described following the project summaries.

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[2] Included at the beginning of the scopes for the majority of the projects is a section titled "Problem Statement and MokeWISE Stakeholder Interests." This section is provided to highlight why the project provides value and characterizes MCG member interests in the project. This "Problem Statement and MokeWISE Stakeholder Interests" section is included as context and is not part of the scope of work for each project.

The following projects and policies and initiatives were identified for inclusion in the MokeWISE implementation plan, and are summarized in the following sections and shown in **Figure 7** and **Figure 8**.

MokeWISE Implementation Projects

- 1a: Re-Introduction of Fall-Run Chinook Salmon Upstream of Pardee Reservoir
- 1b: High Country Meadow Restoration Program
- 1c: Mokelumne River Day Use Area Floodplain Habitat Restoration Project
- 1d: Fish Screens for Riparian Diversions in the Lower Mokelumne
- 1f: Riparian Restoration Program – Below Camanche
- 1g: Mokelumne Water Quality, Soil Erosion, & Sedimentation Inventory/Monitoring
- 2a: Municipal Recycled Wastewater Recharge Program
- 2b: Constellation Winery Wastewater Reuse
- 2c: Amador County Regional Reuse
- 4a: Groundwater Banking within the Eastern San Joaquin Groundwater Basin
- 4b: Amador and Calaveras Counties Hydrologic Assessment
- 4d: NSJWCD Infrastructure Improvements
- 5a: Regional Urban Water Conservation Program
- 5b: Regional Agriculture Conservation Program[3]
- 7a: PG&E Storage Recovery
- 7b: Lower Bear Reservoir Feasibility Update and Preliminary Engineering
- 7d: Re-operation of Existing Storage
- 7f: Blue and Twin Lakes Dams Reliability and Replacement Assessment
- 8b: Rehab of Transmission Main
- 8c: Barney Way Septic System Conversion
- 8d: Lake Camanche Village Recycled Water Project

MokeWISE Policies and Initiatives

- 9a: Land Use Coordination
- 9b: Sustainable Forest - Watershed Management Project
- 9c: Watershed Coordinator
- 9f: MokeWISE Project Public Involvement Initiative

[3] This project was identified as having outstanding concerns. These concerns have been characterized and appended to the project scope, which is included in **Appendix N**.

Figure 7: Upper and Lower Watershed MokeWISE Implementation Projects

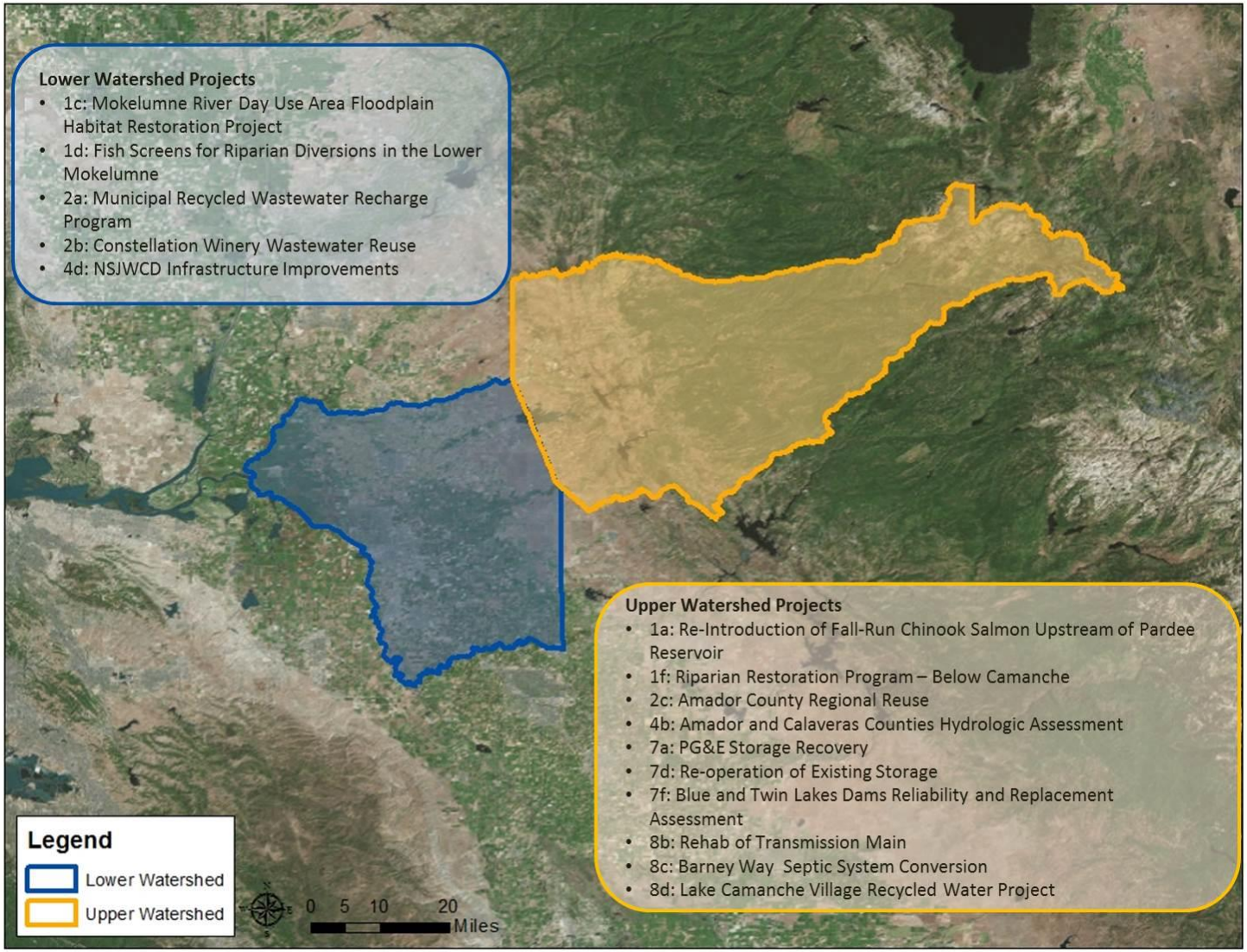
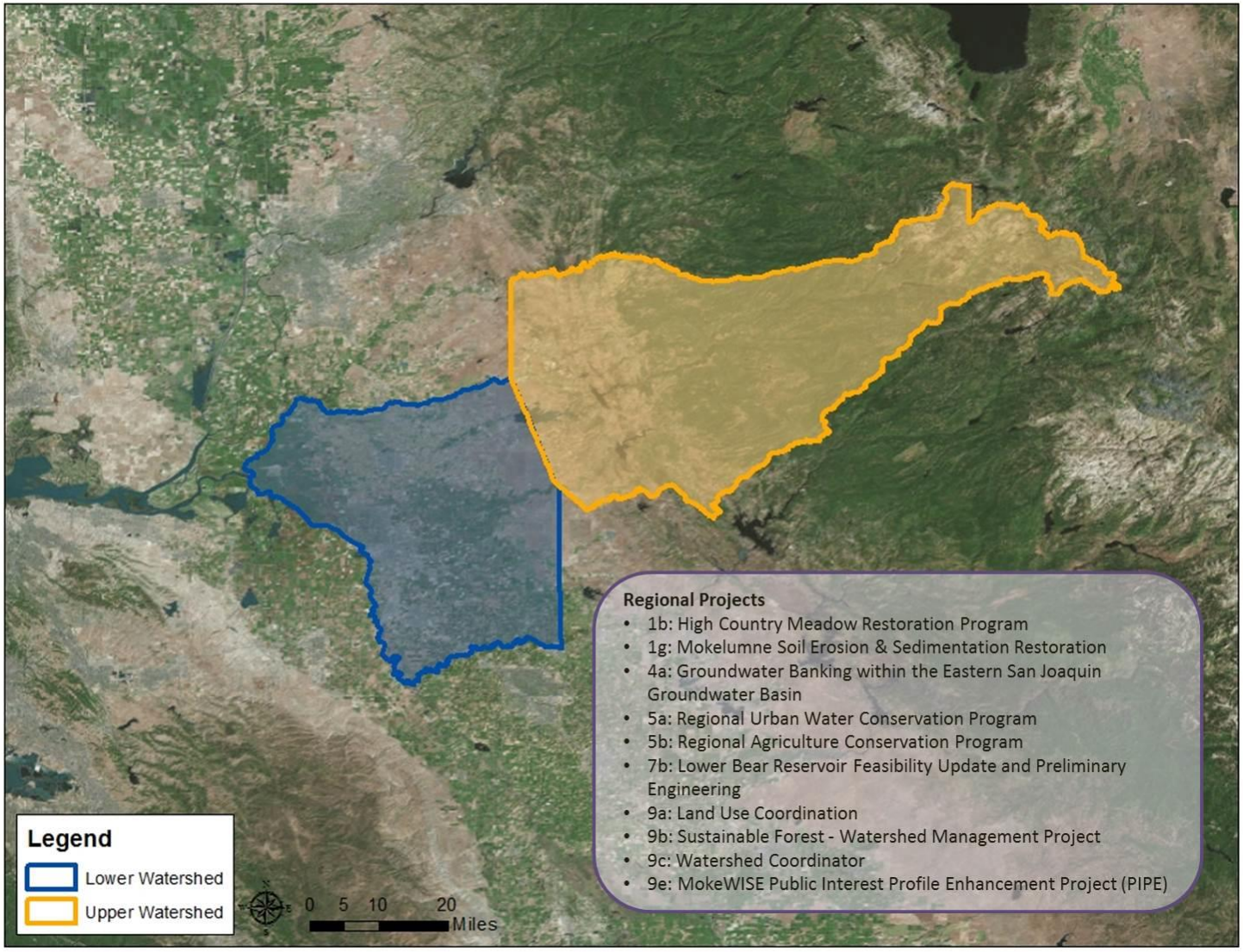


Figure 8: Regional MokeWISE Implementation Projects



PROJECT SPOTLIGHT

1a: Re-Introduction of Fall-Run Chinook Salmon Upstream of Pardee Reservoir

DESCRIPTION:

The Reintroduction of Fall-Run Chinook Salmon Upstream of Pardee Reservoir Project will conduct a study to determine the feasibility of transporting adult fall-run Chinook salmon upstream of Pardee reservoir and transporting the juvenile salmon back downstream of Camanche Dam. The study will evaluate the benefits of and clarify the short and long-term operations and any mitigation required to support the proposed project. The study will also seek to identify any potential impacts and constraints of proposed actions on domestic water supply, river flows, technical, political, environmental, economic, legal, and recreational issues. The project includes data collection and analysis, capture and transport system design, as well as an alternatives analysis. Based on the alternatives analysis, a final design will be selected. Implementation of the project includes environmental documentation and permitting, stakeholder outreach and coordination, construction, and monitoring.

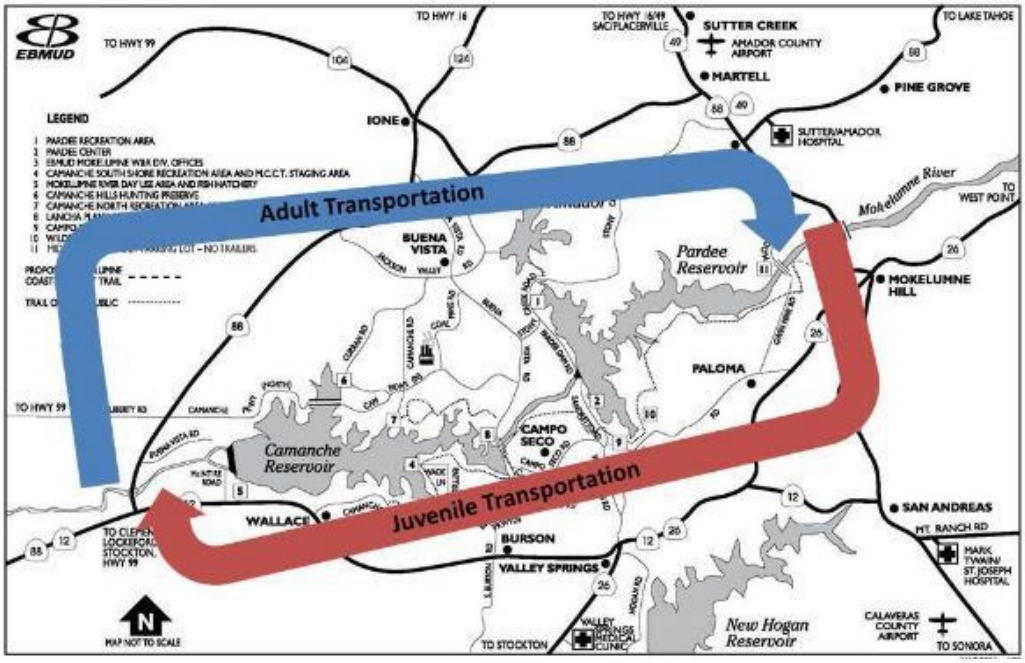
PROJECT:
REINTRODUCTION OF FALL-RUN CHINOOK SALMON UPSTREAM OF PARDEE RESERVOIR

PROJECT TYPE:
ECOSYSTEM/HABITAT PROTECTION

SPONSOR(S):
FOOTHILL CONSERVANCY; CALIFORNIA SPORTFISHING PROTECTION ALLIANCE (CSPA)

ESTIMATED COSTS:
$180,000 (INCLUDES $80,000 FOR PLANNING AND $100,000 FOR IMPLEMENTATION)

LOCATION:



PROJECT SPOTLIGHT

1a: Re-Introduction of Fall-Run Chinook Salmon Upstream of Pardee Reservoir

MOKEWISE PROGRAM OBJECTIVES POTENTIALLY ACHIEVED BY THE PROJECT:

- Recreation
- Data
- Other Human Values
- Environment
- Collaboration
- Avoids Consequences

BENEFITS POTENTIALLY ACHIEVED BY THE PROJECT:

- Recreation
- Nature tourism
- Economic benefits
- Environmental enhancement and habitat restoration

PROJECT SPOTLIGHT

1b: High Country Meadow Restoration

DESCRIPTION:

The High Country Meadow Restoration Project will identify and assess potential meadows for restoration to functioning condition as well as seek funding for the planning phases of identified meadows in the upper Mokelumne River watershed. The project includes involving a stakeholder group and compiling existing data with additional, new meadows identified as in need of restoration in the watershed. Once meadows have been compiled, assessment by a specialist team will be conducted to recommend the type and amount of restoration, and the potential expected benefits to be achieved in each meadow. The collaborative group, potentially the Amador Calaveras Consensus Group (ACCG), will work with the Forest Service, Bureau of Land Management (BLM), and other interested former parties from the MCG, to prioritize the meadows on the list for implementation.

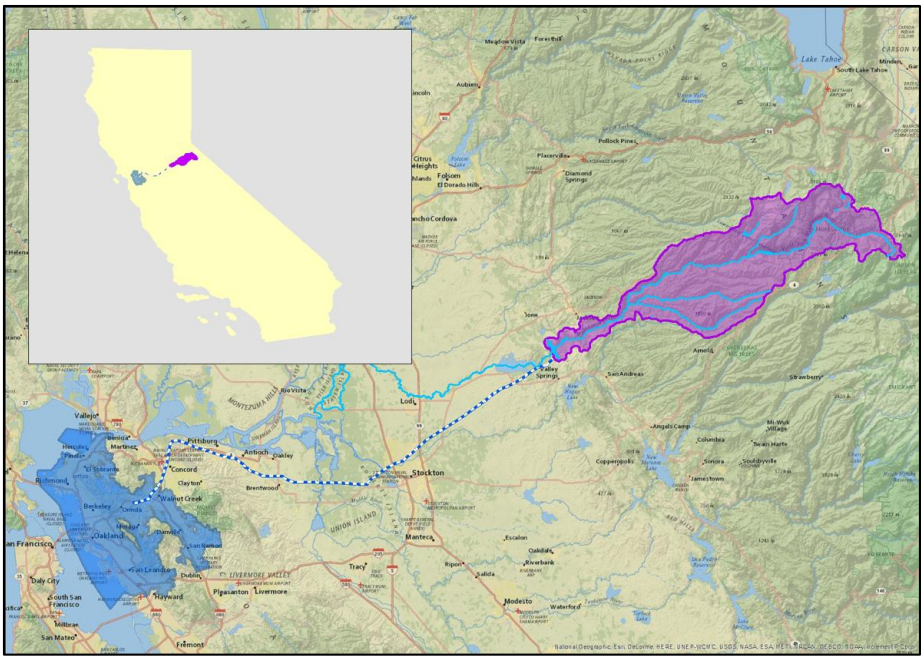
PROJECT:
HIGH COUNTRY MEADOW RESTORATION

PROJECT TYPE:
ECOSYSTEM/HABITAT PROTECTION

SPONSOR(S):
FOOTHILL CONSERVANCY

ESTIMATED COSTS:
$40,000 + $10,000 * NUMBER OF ACRES RESTORED

LOCATION:



Source: Sierra Nevada Conservancy 2014

PROJECT SPOTLIGHT

1b: High Country Meadow Restoration

MOKEWISE PROGRAM OBJECTIVES POTENTIALLY ACHIEVED BY THE PROJECT:

- Water Supply/Water Resources
- Water Quality
- Recreation
- Flood Management
- Data
- Other Human Values
- Environment
- Collaboration
- Avoids Consequences

BENEFITS POTENTIALLY ACHIEVED BY THE PROJECT:

- Municipal and industrial water supply
- Agricultural water supply
- Recreation
- Hydropower
- Nature tourism
- Energy costs
- Flood management
- Economic benefits
- Environmental enhancement and habitat restoration
- Improved source water quality

PROJECT SPOTLIGHT

1c: Mokelumne River Day Use Area Floodplain Habitat Restoration Project

DESCRIPTION:

The juvenile lifestage of both salmon and steelhead/rainbow trout is widely believed by resource managers of the Mokelumne River to be their most vulnerable lifestage. Riparian and channel improvements in the lower Mokelumne River can help improve juvenile survival by providing both cover and edgewater habitat. The Mokelumne River Day Use Area (MRDUA) Floodplain Habitat Restoration Project will reconfigure lands included in the MRDUA to create 1 acre of seasonal floodplain that would also serve as habitat for juvenile salmonids and other native fish species within the lower Mokelumne River. The project would include conducting site excavation and materials screening, which will determine which materials are appropriate for use. Finally, the project will conduct gravel placement and recontouring per work previously conducted by EBMUD.

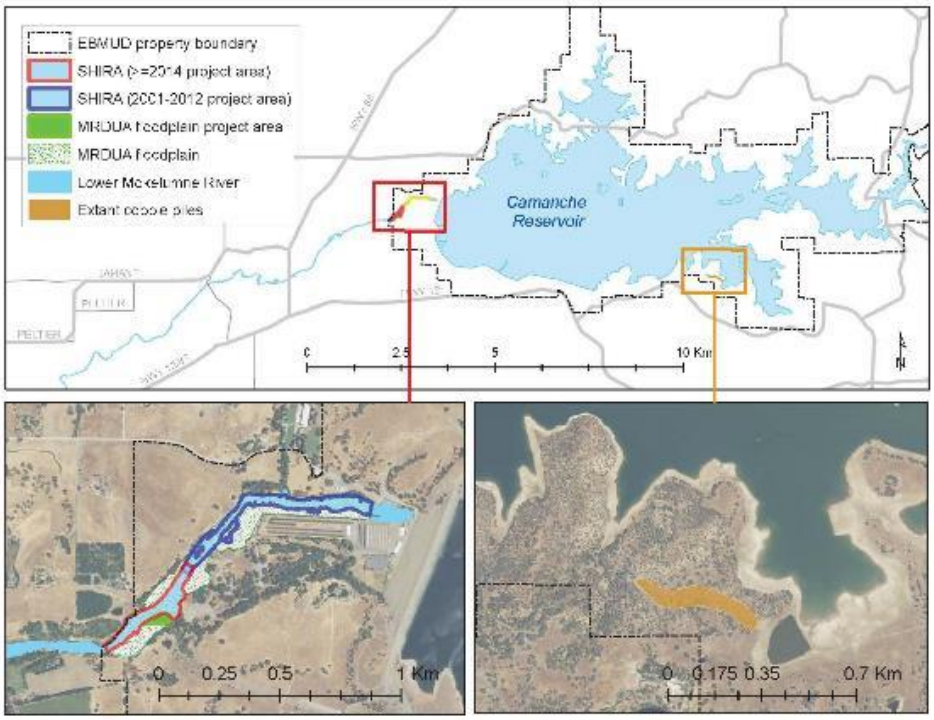
PROJECT:
MOKELUMNE RIVER DAY USE AREA FLOODPLAIN HABITAT RESTORATION PROJECT

PROJECT TYPE:
ECOSYSTEM/HABITAT PROTECTION

SPONSOR(S):
SJCRCD, CSPA (CO-SPONSOR)

ESTIMATED COSTS:
$150,000, INCLUDING $111,000 FOR IMPLEMENTATION AND A 30% CONTINGENCY.

LOCATION:



PROJECT SPOTLIGHT

1c: Mokelumne River Day Use Area Floodplain Habitat Restoration Project

MOKEWISE PROGRAM OBJECTIVES POTENTIALLY ACHIEVED BY THE PROJECT:

- Water Supply/Water Resources
- Water Quality
- Recreation
- Flood Management
- Data
- Other Human Values
- Environment
- Collaboration
- Avoids Consequences

BENEFITS POTENTIALLY ACHIEVED BY THE PROJECT:

- Recreation
- Nature tourism
- Flood management
- Economic benefits
- Environmental enhancement and habitat restoration
- Improved source water quality

PROJECT SPOTLIGHT

1d: Fish Screens for Riparian Diversions in the Lower Mokelumne River

DESCRIPTION:

The Fish Screens for Riparian Diversions in the Lower Mokelumne River Project will develop and implement a program to identify and prioritize riparian diversions on the lower Mokelumne River for installation of new fish screens. This includes conducting a diversion assessment and establishing screening design criteria for individual diversions. The project would conduct a funding assessment to determine potential funding sources for screen installation. Working with willing landowners, the project will secure necessary permits, install fish screens, and develop a monitoring strategy.

PROJECT:
FISH SCREENS FOR RIPARIAN DIVERSIONS IN THE LOWER MOKELUMNE RIVER

PROJECT TYPE:
ECOSYSTEM/HABITAT PROTECTION

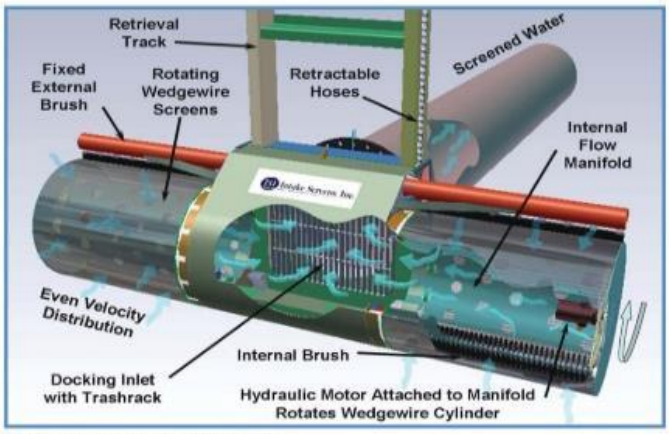
SPONSOR(S):
TROUT UNLIMITED

ESTIMATED COSTS:
$10,000 PER CFS SCREENEDTOTAL PROJECT COSTS ARE ESTIMATED TO BE $300,000 FOR THE PRELIMINARY ASSESSMENT AND PRIORITIZATION AND $10,000 MULTIPLIED BY THE NUMBER OF CFS SCREENED

EXAMPLES OF TYPICAL CYLINDRICAL FISH SCREENS:

Cylindrical Screen Gallery

Cylindrical Screen/Inclined Track



Cut-Away View of Cylindrical Fish Screen

PROJECT SPOTLIGHT

1d: Fish Screens for Riparian Diversions in the Lower Mokelumne River

MOKEWISE PROGRAM OBJECTIVES POTENTIALLY ACHIEVED BY THE PROJECT:

- Water Supply/Water Resources
- Recreation
- Data
- Other Human Values
- Environment
- Agricultural Benefits
- Collaboration
- Avoids Consequences

BENFITS POTENTIALLY ACHIEVED BY THE PROJECT:

- Municipal and industrial water supply
- Agricultural water supply
- Recreation
- Nature tourism
- Economic benefits
- Environmental enhancement and habitat restoration

PROJECT SPOTLIGHT

1f: Riparian Restoration Program – Below Camanche Reservoir

DESCRIPTION:

The Riparian Restoration Program below Camanche Reservoir will support the implementation efforts of the Lower Mokelumne Watershed Stewardship Plan, which analyzes and addresses riparian restoration needs. The program will study and evaluate potential areas for restoration below Camanche Reservoir, with a focus on the area from the base of the Camanche Dam to the confluence of the Cosumnes and Mokelumne Rivers.

Using previous efforts as a guide, this project seeks to build on the successful template for ecosystem-based watershed restoration efforts including the continued encouragement and implementation of voluntary restoration and monitoring activities. Implementation could be scaled or conducted in phases depending on funding availability.

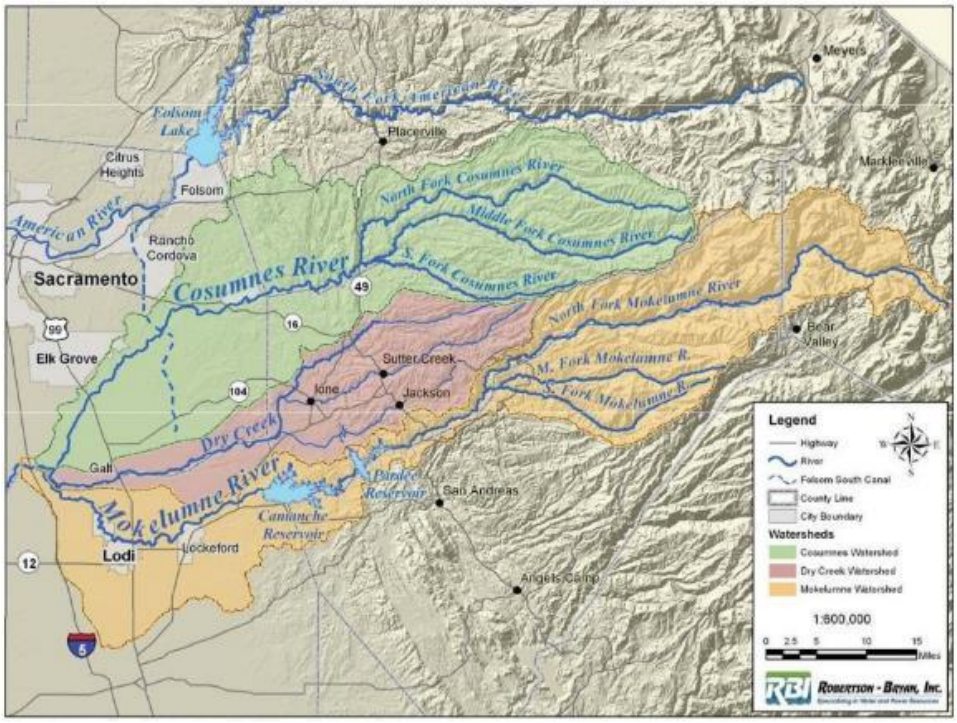
PROJECT:
RIPARIAN RESTORATION PROGRAM BELOW CAMANCHE RESERVOIR

PROJECT TYPE:
ECOSYSTEM/HABITAT PROTECTION

SPONSOR(S):
SJCRCD, FHC (CO-SPONSOR)

ESTIMATED COSTS:
$10,000 FOR RANKING AND EVALUATION OF EACH PROPOSED RESTORATION SITE AND $8,000 PER ACRE RESTORED

LOCATION:



PROJECT SPOTLIGHT

1f: Riparian Restoration Program – Below Camanche Reservoir

MOKEWISE PROGRAM OBJECTIVES POTENTIALLY ACHIEVED BY THE PROJECT:

- Water Supply/Water Resources
- Water Quality
- Recreation
- Data
- Other Human Values
- Environment
- Collaboration
- Avoids Consequences

BENEFITS POTENTIALLY ACHIEVED BY THE PROJECT:

- Municipal and industrial water supply
- Agricultural water supply
- Recreation
- Nature tourism
- Flood management
- Economic benefits
- Environmental enhancement and habitat restoration
- Improved source water quality

PROJECT SPOTLIGHT

1g: Mokelumne Water Quality, Soil Erosion & Sedimentation Inventory/Monitoring

DESCRIPTION:

This project will identify, assess, prioritize, and publish a report on areas of soil erosion-sedimentation reduction in the 368,000 acres of the Mokelumne Watershed above Pardee Reservoir. The project includes establishing and coordinating with a stakeholder group and evaluating existing data and setting priorities for soil erosion and sedimentation reduction or any other source of pollutants entering the river or tributaries. Once sources of soil erosion and delivery to the Mokelumne River or tributaries have been mapped and digitized for analysis and future reference, a method for prioritizing these for restoration will be developed. Sources of restoration work based on the information produced by this project, would be primarily focused on property owners.

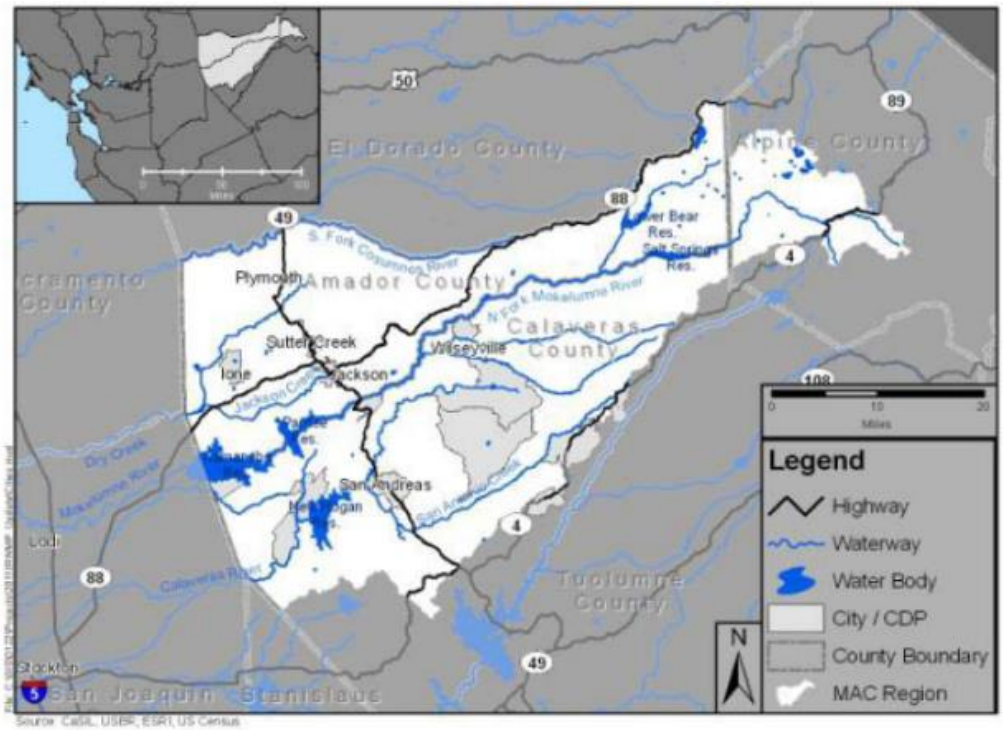
PROJECT:
MOKELUMNE WATER QUALITY, SOIL EROSION & SEDIMENTATION INVENTORY/MONITORING

PROJECT TYPE:
ECOSYSTEM/HABITAT PROTECTION

SPONSOR(S):
AWA

ESTIMATED COSTS:
$1,080,000 FOR OUTREACH, MAPPING, ASSESSING, PRIORITIZING, PUBLISHING RESULTS IN A USEABLE FORMAT, AND SEEKING FOLLOW-UP EROSION-SEDIMENTATION WORK

LOCATION:



PROJECT SPOTLIGHT

1g: Mokelumne Water Quality, Soil Erosion & Sedimentation Inventory/Monitoring

MOKEWISE PROGRAM OBJECTIVES POTENTIALLY ACHIEVED BY THE PROJECT:

- Water Supply/Water Resources
- Water Quality
- Recreation
- Flood Management
- Data
- Other Human Values
- Environment
- Collaboration
- Avoids Consequences

BENEFITS POTENTIALLY ACHIEVED BY THE PROJECT:

- Municipal and industrial water supply
- Agricultural water supply
- Recreation
- Hydropower
- Nature tourism
- Energy costs
- Flood management
- Economic benefits
- Environmental enhancement and habitat restoration
- Improved source water quality

PROJECT SPOTLIGHT

2a: Municipal Recycled Wastewater Recharge Program

DESCRIPTION:

The Municipal Recycled Wastewater Recharge Program will investigate the potential for using treated, disinfected wastewater to recharge groundwater aquifers in the valley, either directly or indirectly through in-lieu use of the recycled water. This project includes a feasibility study and implementation of the recommendations outlined in the feasibility study. The feasibility study will include completing a groundwater flow analysis, determining the potential for direct recharge, and developing a recycled water demand analysis. This information will inform the development of project alternatives. The recommended project will be further developed through design work. Implementation will include permitting, site preparation, construction, and testing.

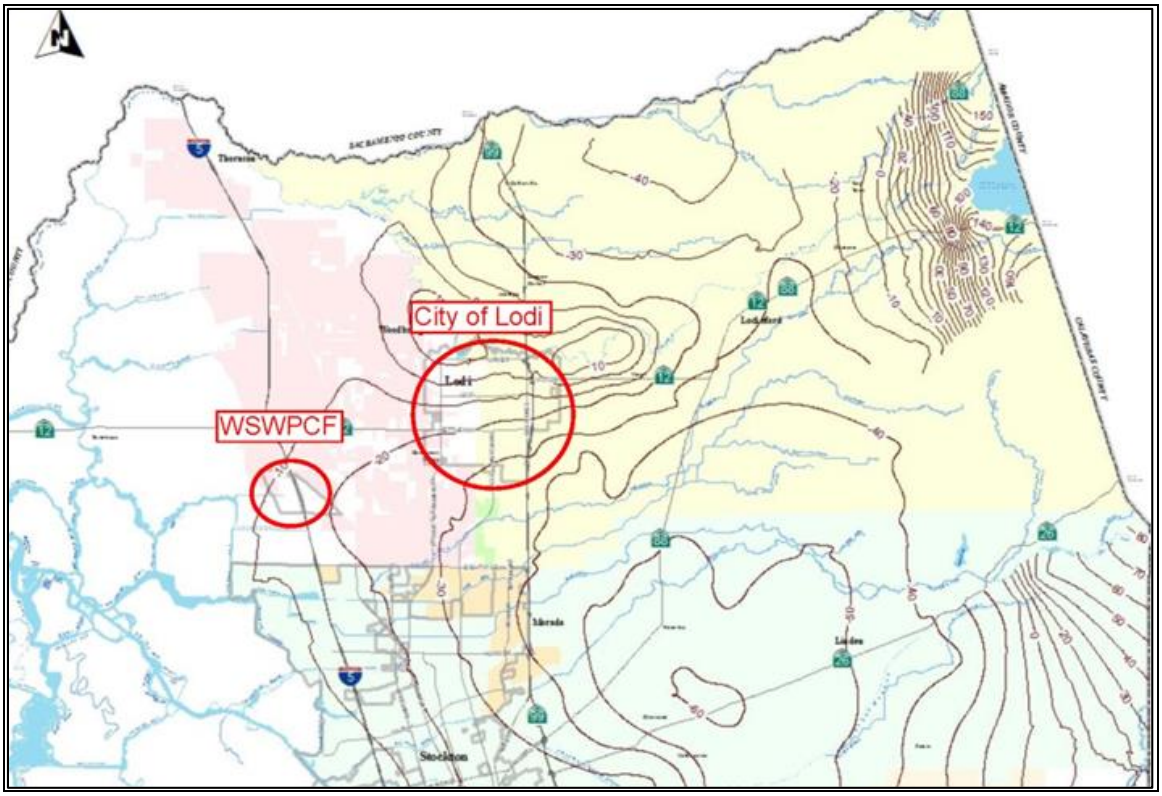
PROJECT:
MUNICIPAL RECYCLED WASTEWATER RECHARGE PROGRAM

PROJECT TYPE:
RECYCLED WATER

SPONSOR(S):
CITY OF LODI

ESTIMATED COSTS:
$15.15 MILLION (INCLUDES $150,000 FOR THE FEASIBILITY STUDY AND $15 MILLION FOR IMPLEMENTATION)

LOCATION:



PROJECT SPOTLIGHT

2a: Municipal Recycled Wastewater Recharge Program

MOKEWISE PROGRAM OBJECTIVES POTENTIALLY ACHIEVED BY THE PROJECT:

- Water Supply/Water Resources
- Water Quality
- Data
- Other Human Values
- Agricultural Benefits
- Collaboration
- Avoids Consequences

BENEFITS POTENTIALLY ACHIEVED BY THE PROJECT:

- Municipal and industrial water supply
- Agricultural water supply
- Economic benefits
- Improved source water quality

PROJECT SPOTLIGHT

2b: Constellation Winery Wastewater Reuse

DESCRIPTION:

The Constellation Winery Wastewater Reuse Project will expand the distribution of treated wastewater from Constellation's Woodbridge Winery to the NSJWCD's distribution system for use by other entities within NSJWCD's service area. Implementing this project would require connecting the NSJWCD's non-potable water conveyance system to Woodbridge Winery's treated wastewater system, and connecting the NSJWCD's 4th diversion point from the Mokelumne River this joint conveyance system for blending. The project would include developing a conceptual design report that would include an assessment of feasibility. Pending feasibility, final design and environmental documentation will be conducted and necessary permits will be secured. Implementation will include site preparation, construction, testing.

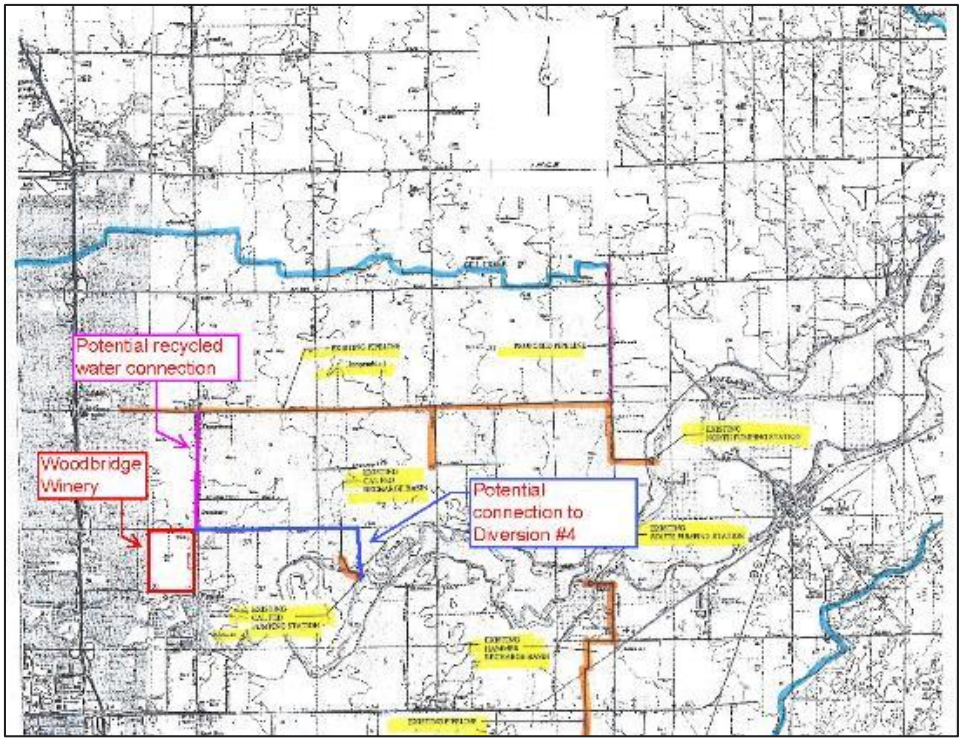
PROJECT:
CONSTELLATION WINERY WASTEWATER REUSE

PROJECT TYPE:
RECYCLED WATER

SPONSOR(S):
CONSTELLATION WINERY

ESTIMATED COSTS:
$16.16 MILLION (INCLUDES $35,000 FOR THE CONCEPTUAL DESIGN REPORT, $100,000 FOR SECURING THE WASTE DISCHARGE REPORT PERMIT, $25,000 FOR SECURING FUNDING, AND $16 MILLION FOR CONSTRUCTION)

LOCATION:



PROJECT SPOTLIGHT

2b: Constellation Winery Wastewater Reuse

MOKEWISE PROGRAM OBJECTIVES POTENTIALLY ACHIEVED BY THE PROJECT:

- Water Supply/Water Resources
- Water Quality
- Data
- Other Human Values
- Environment
- Agricultural Benefits
- Collaboration
- Avoids Consequences

BENEFITS POTENTIALLY ACHIEVED BY THE PROJECT:

- Municipal and industrial water supply
- Agricultural water supply
- Economic benefits
- Environmental enhancement and habitat restoration
- Improved source water quality

PROJECT SPOTLIGHT

2c: Amador County Reuse

PROJECT:
AMADOR COUNTY REUSE

PROJECT TYPE:
RECYCLED WATER

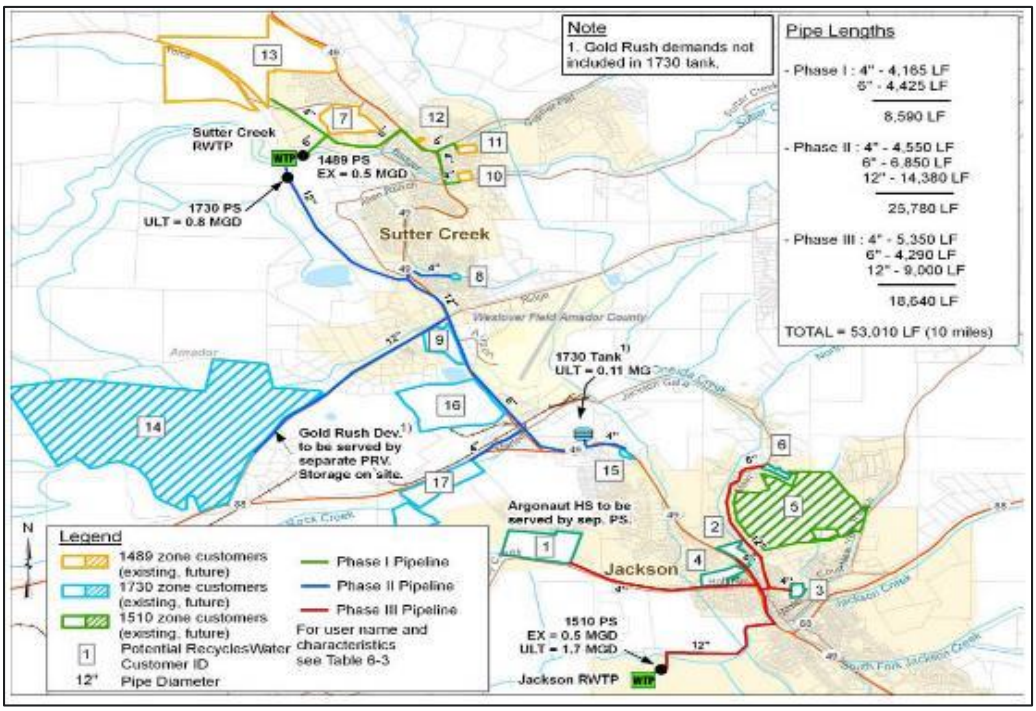
SPONSOR(S):
AWA

ESTIMATED COSTS:
$21.75 MILLION (INCLUDING $400,000 FOR THE REFINEMENT STUDY AND $21.35 MILLION FOR IMPLEMENTATION)

DESCRIPTION:

The Amador County Regional Reuse Project will implement Alternative 3 as developed in the 2013 Regional Approach for Reuse Study by Amador Water Agency. The Study considered the feasibility and options for increasing tertiary-treated recycled water production and use in the region. It was determined that the Alternative 3, the decentralized alternative, is the preferred alternative. This would upgrade the recycled water treatment plant located in the City of Jackson to serve local users and construct a recycled water treatment plant located in the City of Sutter Creek to serve users located in Sutter Creek, Amador City, Martell, and the Gold Rush Ranch Development. The project will conduct a refinement study to develop a more detailed project description for Alternative 3. After the refinement study, the project will undergo design and construction, as well as salt and nutrient management planning, permitting and user agreements, and environmental documentation. A recycled water rules and mandatory use ordinance will be finalized and adopted.

LOCATION:



PROJECT SPOTLIGHT

2c: Amador County Reuse

MOKEWISE PROGRAM OBJECTIVES POTENTIALLY ACHIEVED BY THE PROJECT:

- Water Supply/Water Resources
- Water Quality
- Data
- Other Human Values
- Agricultural Benefits
- Collaboration
- Avoids Consequences

BENEFITS POTENTIALLY ACHIEVED BY THE PROJECT:

- Municipal and industrial water supply
- Agricultural water supply
- Hydropower
- Nature tourism
- Energy costs
- Economic benefits
- Improved source water quality

PROJECT SPOTLIGHT

4a: Groundwater Banking within the Eastern San Joaquin Groundwater Basin

DESCRIPTION:

This study will determine the basis for and feasibility of groundwater banking within the Eastern San Joaquin Groundwater Subbasin with the objective of improving reliable water supplies for not only Eastern San Joaquin County, but also the East Bay Municipal Utility District and the Upper Mokelumne River Watershed region. The desired outcomes of a potential project are improved groundwater levels in the vicinity of the groundwater banking location, the development of a reliable alternative water supply for agencies who rely on Mokelumne River water, and also increased flexibility to provide environmental benefits to the Mokelumne watershed. Consistent with the intent of MokeWISE, the study will also consider impacts and benefits to the environment, conduct an analysis of the feasibility of alternative supplies to the Mokelumne River including stormwater capture, locally-generated recycled water, and conserved water, and identify climate change adaptation. This document summarizes the approach for analyzing and developing the proposed project concept in the form of a feasibility study.

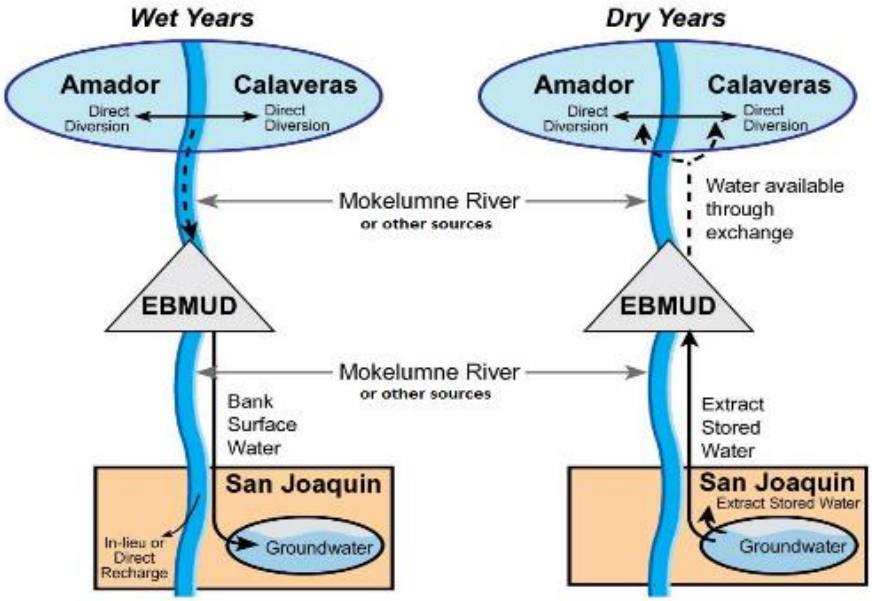
PROJECT:
GROUNDWATER BANKING WITHIN THE EASTERN SAN JOAQUIN GROUNDWATER BASIN

PROJECT TYPE:
GROUNDWATER

SPONSOR(S):
SJC GBA, CCWD, NSJWCD

ESTIMATED COSTS:
$3,605,000 (INCLUDES FIELD INVESTIGATIONS, STAKEHOLDER COORDINATION, ETC.)

POTENTIAL GROUNDWATER BANKING SCHEMATIC:



PROJECT SPOTLIGHT

4a: Groundwater Banking within the Eastern San Joaquin Groundwater Basin

MOKEWISE PROGRAM OBJECTIVES POTENTIALLY ACHIEVED BY THE PROJECT:

- Water Supply/Water Resources
- Water Quality
- Flood Management
- Data
- Other Human Values
- Agricultural Benefits
- Collaboration
- Avoids Consequences

BENEFITS POTENTIALLY ACHIEVED BY THE PROJECT:

- Municipal and industrial water supply
- Agricultural water supply
- Recreation
- Flood management
- Economic benefits
- Environmental enhancement and habitat restoration
- Improved source water quality

PROJECT SPOTLIGHT

4b: Amador and Calaveras Counties Hydrologic Assessment

PROJECT:
AMADOR AND CALAVERAS COUNTIES HYDROLOGIC ASSESSMENT

PROJECT TYPE:
GROUNDWATER

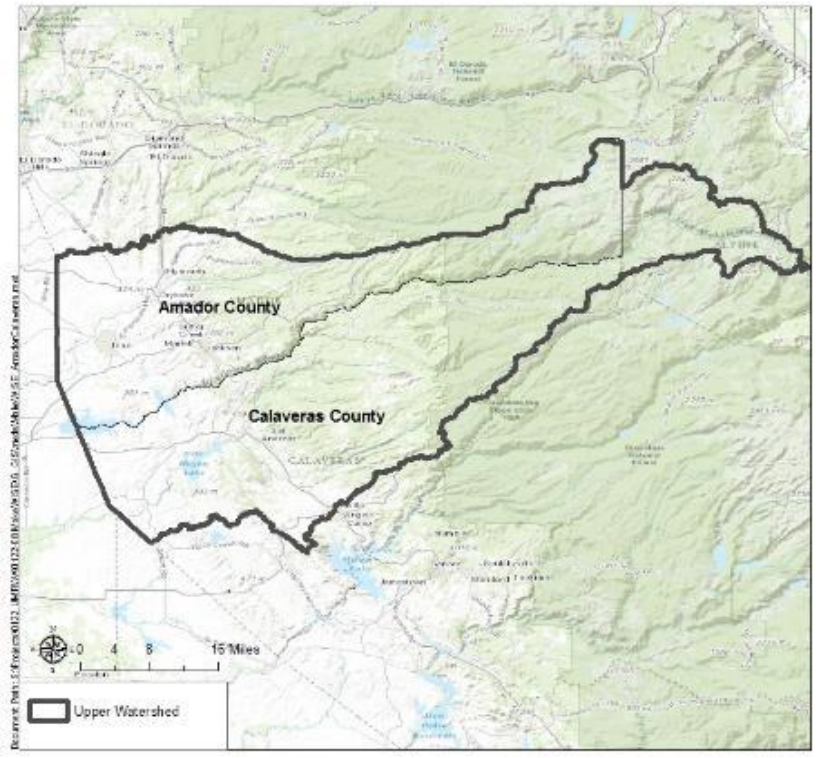
SPONSOR(S):
AWA, CCWD

ESTIMATED COSTS:
$600,000

DESCRIPTION:

Very little quantitative information is available on the carrying capacities of the local groundwater systems within Sierra Nevada foothill areas. Those groundwater systems occur mostly in poorly permeable fractured rock, within which groundwater storage is limited to the small volume represented by the fracture openings. Natural recharge occurs seasonally from the deep percolation of precipitation during the winter. However, the recharge is the small percentage of precipitation remaining after the loss of precipitation to runoff or the consumptive use of vegetation. This characteristic makes the foothill groundwater systems very sensitive to seasonal, year-to-year, and long-term changes in precipitation. This study seeks to answer questions regarding groundwater recharge in Amador and Calaveras Counties so that sustainable groundwater evaluations can be determined to guide land use decisions and provide direction to water agencies to meet planned water needs.

LOCATION:



PROJECT SPOTLIGHT

4b: Amador and Calaveras Counties Hydrologic Assessment

MOKEWISE PROGRAM OBJECTIVES POTENTIALLY ACHIEVED BY THE PROJECT:

- Water Supply/Water Resources
- Water Quality
- Data
- Other Human Values
- Agricultural Benefits
- Collaboration
- Avoids Consequences

BENEFITS POTENTIALLY ACHIEVED BY THE PROJECT:

- Municipal and industrial water supply
- Agricultural water supply
- Recreation
- Economic benefits
- Environmental enhancement and habitat restoration
- Improved source water quality

PROJECT SPOTLIGHT

4d: North San Joaquin Water Conservation District Infrastructure Improvements

PROJECT:
NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT INFRASTRUCTURE IMPROVEMENTS

PROJECT TYPE:
GROUNDWATER

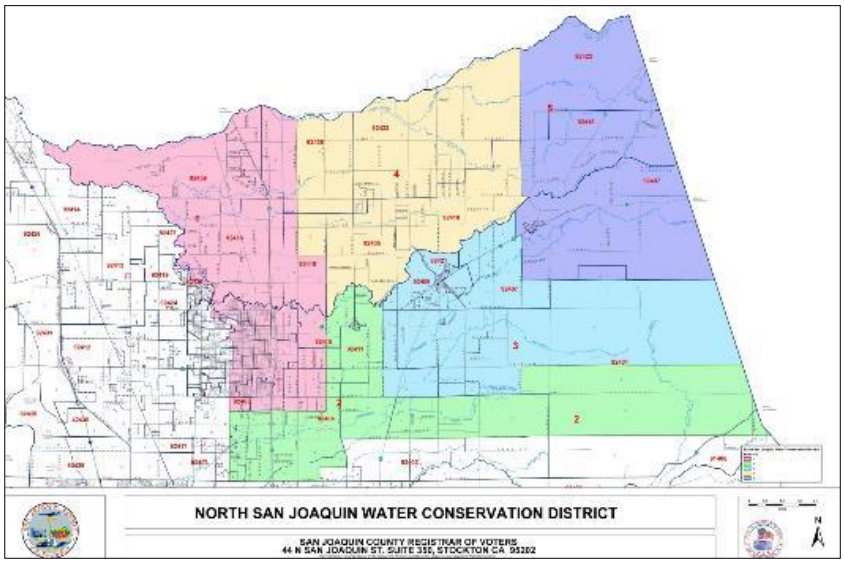
SPONSOR(S):
NSJWCD

ESTIMATED COSTS:
$20,000,000 ($2.2 MILLION TO IMPLEMENT INFRASTRUCTURE IMPROVEMENTS AND $10-18 MILLION FOR THE DISTRIBUTION SYSTEM REHABILITATION)

DESCRIPTION:

North San Joaquin Water Conservation District's (NSJWCD's) existing surface water source is Permit 10477, which allows the district to extract water from the Mokelumne River in years when water surplus to the needs of EBMUD and other prior right holders is available. Rehabilitation of the South Pump and Distribution System will help enable NSJWCD to put the water available under Permit 10477 to beneficial use. This Project could also allow NSJWCD to leverage its improved distribution system for groundwater banking. Groundwater banking projects would involve the delivery of additional surface water into the NSJWCD service area, from another source (such as EBMUD). NSJWCD would require that some of the banked water be left in the NSJWCD service area and not extracted, as a condition, in order to obtain local benefits from the banking and assist in correcting overdraft. Such an arrangement would bring additional surface water into the NSJWCD region to help reduce groundwater demand, and would allow NSJWCD to spread the costs of its distribution system and operations among additional users, thereby making the use of the system by local farmers more economical.

LOCATION:



PROJECT SPOTLIGHT

4d: North San Joaquin Water Conservation District Infrastructure Improvements

MOKEWISE PROGRAM OBJECTIVES POTENTIALLY ACHIEVED BY THE PROJECT:

- Water Supply/Water Resources
- Water Quality
- Data
- Other Human Values
- Agricultural Benefits
- Collaboration
- Avoids Consequences

BENEFITS POTENTIALLY ACHIEVED BY THE PROJECT:

- Agricultural water supply
- Economic benefits
- Improved source water quality

PROJECT SPOTLIGHT

5a: Regional Urban Water Conservation Program

DESCRIPTION:

The Regional Urban Water Conservation Program will develop a program to reduce demand through implementation of efficient urban water use practices. The program will evaluate existing conservation measures and programs being implemented in the region and identify opportunities for further water efficiency gains. The program will develop a regional conservation plan to pursue funding opportunities, which would then be distributed among participating agencies to fund municipal conservation plan implementation.

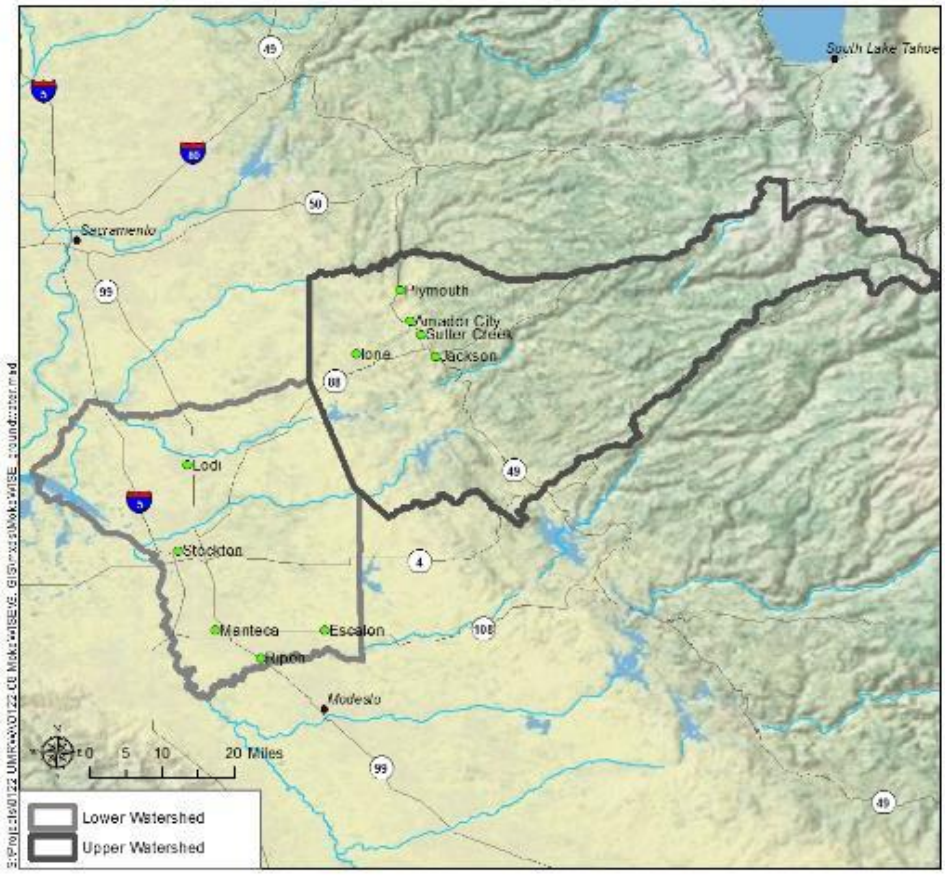
LOCATION:

PROJECT:
REGIONAL URBAN WATER CONSERVATION PROGRAM

PROJECT TYPE:
WATER CONSERVATION

SPONSOR(S):
UMRWA, SJC GBA, CITY OF STOCKTON, CITY OF LODI

ESTIMATED COSTS:
$80,000 ($60,000 FOR PLANNING AND $20,000 TO A FUNDING APPLICATION)



PROJECT SPOTLIGHT

5a: Regional Urban Water Conservation Program

MOKEWISE PROGRAM OBJECTIVES POTENTIALLY ACHIEVED BY THE PROJECT:

- Water Supply/Water Resources
- Water Quality
- Data
- Other Human Values
- Environment
- Collaboration
- Avoids Consequences

BENEFITS POTENTIALLY ACHIEVED BY THE PROJECT:

- Municipal and industrial water supply
- Agricultural water supply
- Hydropower
- Nature tourism
- Energy costs
- Economic benefits
- Environmental enhancement and habitat restoration
- Improved source water quality

PROJECT SPOTLIGHT

5b: Regional Agricultural Water Conservation Program

PROJECT:
REGIONAL AGRICULTURAL WATER CONSERVATION PROGRAM

PROJECT TYPE:
WATER CONSERVATION

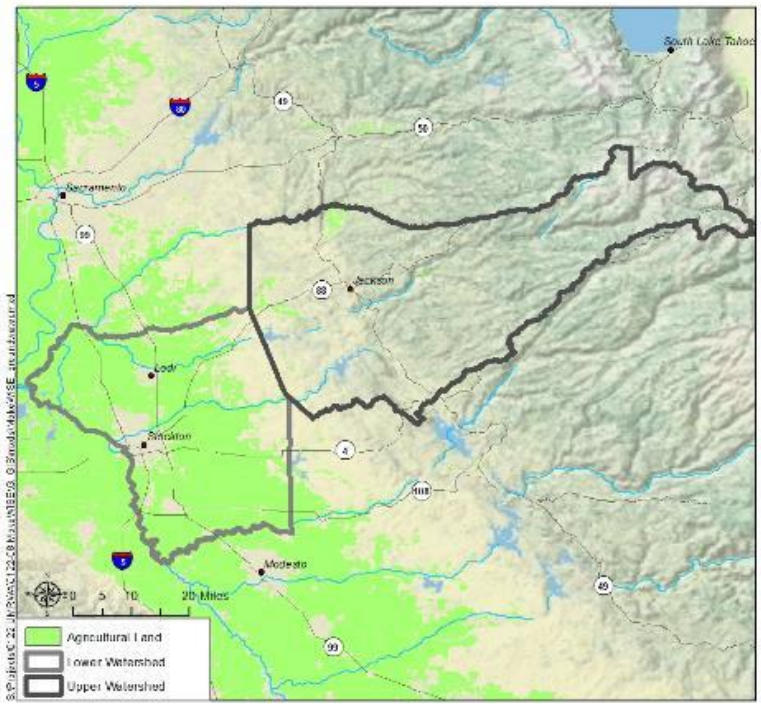
SPONSOR(S):
SJC RCD

ESTIMATED COSTS:
$100,000 ($80,000 FOR PLANNING AND $20,000 TO A FUNDING APPLICATION)

DESCRIPTION*:

The Regional Agriculture Conservation Program will develop a program to reduce agricultural water use through evaluation and testing of agricultural management practices for irrigation water management efficiency. The program will evaluate existing conservation measures and programs already being implemented in the region and identify opportunities for further water efficiency gains. Based on identified opportunities, the program would develop a regional agricultural water conservation plan to implement the identified strategies that would enhance irrigation efficiency. The plan would be used as the basis for pursuing funding opportunities, which would be distributed among participating members to fund program agricultural water conservation project implementation.

LOCATION:



* This project was identified as having outstanding concerns. These concerns have been characterized and appended to the project scope, which is included in **Appendix N**.

PROJECT SPOTLIGHT

5b: Regional Agricultural Water Conservation Program

MOKEWISE PROGRAM OBJECTIVES POTENTIALLY ACHIEVED BY THE PROJECT:

- Water Supply/Water Resources
- Water Quality
- Data
- Other Human Values
- Environment
- Agricultural Benefits
- Collaboration
- Avoids Consequences

BENEFITS POTENTIALLY ACHIEVED BY THE PROJECT:

- Municipal and industrial water supply
- Agricultural water supply
- Hydropower
- Nature tourism
- Energy costs
- Economic benefits
- Environmental enhancement and habitat restoration
- Improved source water quality

PROJECT SPOTLIGHT

7a: PG&E Reservoir Storage Recovery

DESCRIPTION:

Amador Water Agency uses some of PG&E's hydroelectric reservoirs and related facilities for the Agency's water supply. Unfortunately, erosion, and sedimentation in the Mokelumne watershed has, to varying degrees, gradually filled PG&E reservoirs with sediment. This project will assess the feasibility of and potential environmental effects of removing sediment from seven PG&E reservoirs in the upper Mokelumne watershed.

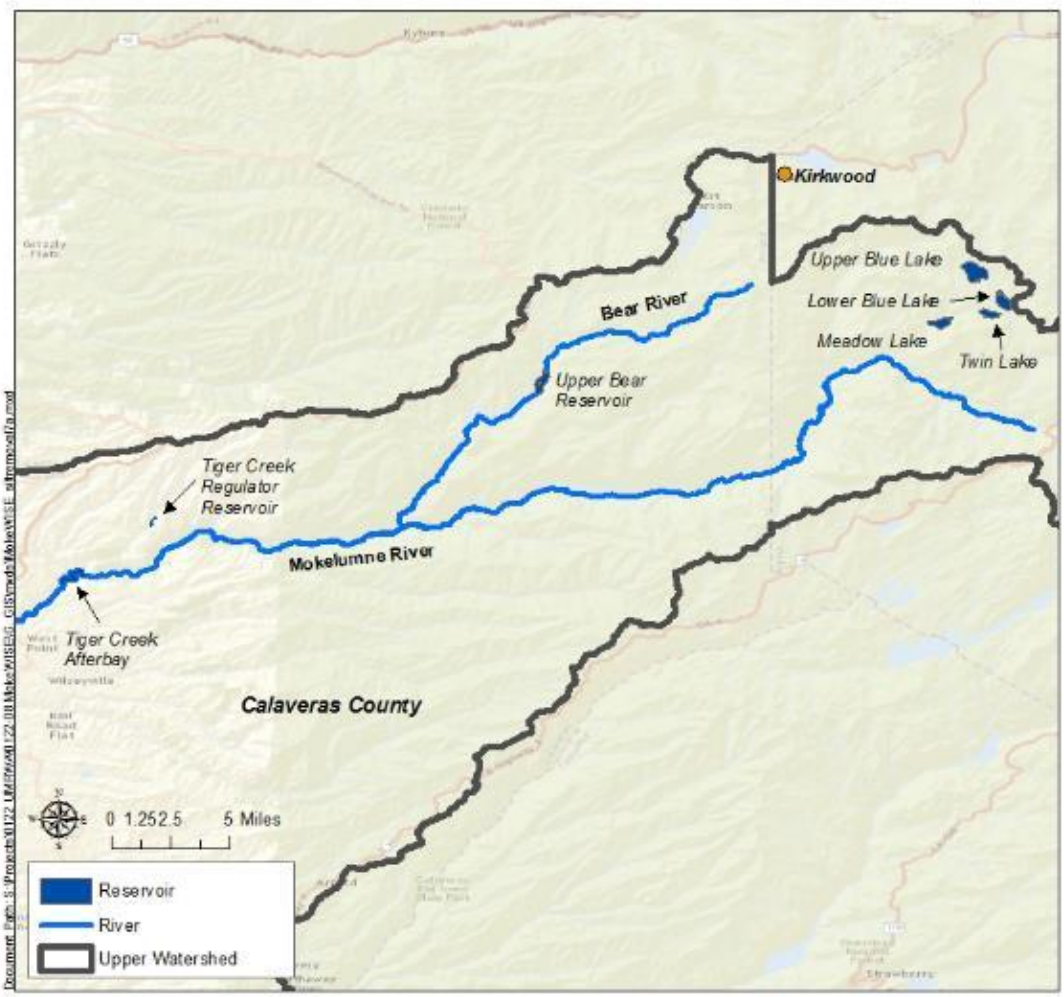
PROJECT:
PG&E RESERVOIR STORAGE RECOVERY

PROJECT TYPE:
STORAGE

SPONSOR(S):
AWA

ESTIMATED COSTS:
$350,000 TO COMPLETE THE STUDY

LOCATION:



PROJECT SPOTLIGHT

7a: PG&E Reservoir Storage Recovery

MOKEWISE PROGRAM OBJECTIVES POTENTIALLY ACHIEVED BY THE PROJECT:

- Water Supply/Water Resources
- Flood Management
- Data
- Other Human Values
- Environment
- Agricultural Benefits
- Collaboration
- Avoids Consequences

BENEFITS POTENTIALLY ACHIEVED BY THE PROJECT:

- Municipal and industrial water supply
- Agricultural water supply
- Hydropower
- Nature tourism
- Energy costs
- Flood management
- Economic benefits
- Environmental enhancement and habitat restoration

PROJECT SPOTLIGHT

7b: Raise Lower Bear Feasibility Study

DESCRIPTION:

The study will evaluate the feasibility of enlarging Lower Bear Reservoir by raising the existing dam (embankment) by up to 32 feet to increase surface water storage capacity within the upper Mokelumne River watershed and operating the enlarged reservoir to protect the Mokelumne River and its resources consistent with the existing licenses, permits, legal agreements, legal decisions, and operating regimes that currently protect the river's water quality, cultural and historical resources, recreational uses, scenic values. In addition to modifications to the dam itself, the study will evaluate construction of an updated intake structure and spillway, and relocation of adjacent roads and existing recreation facilities. This feasibility study will be a continuation of previous studies and serve to address previously unanswered questions and unresolved issues.

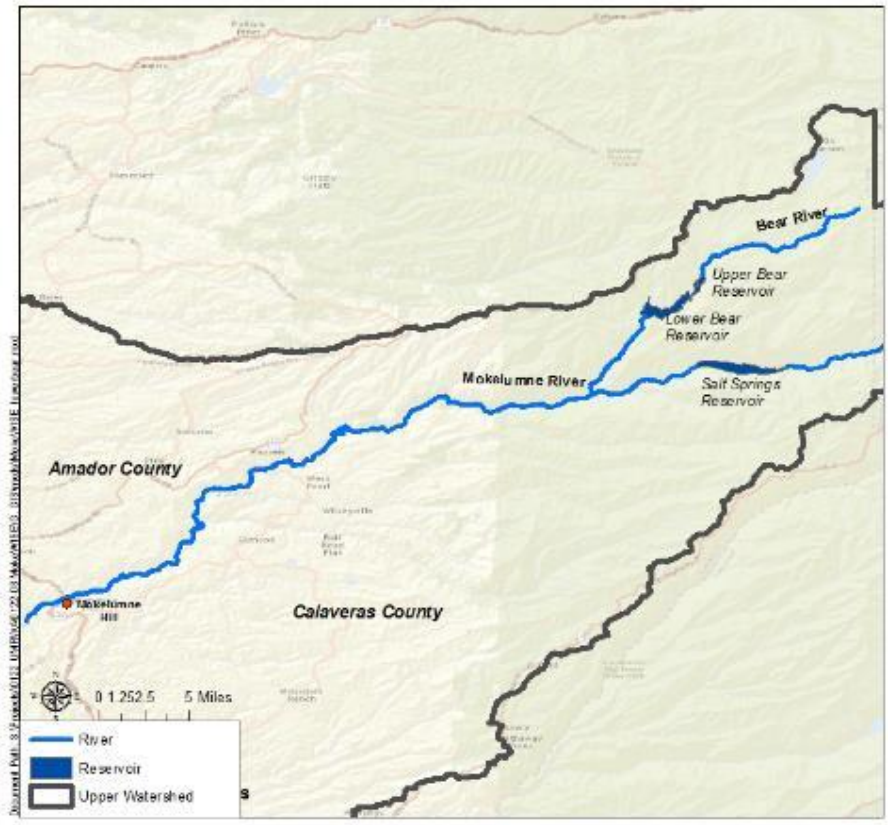
PROJECT:
RAISE LOWER BEAR FEASIBILITY STUDY

PROJECT TYPE:
STORAGE

SPONSOR(S):
AWA, JVID, CCWD, CPUD

ESTIMATED COSTS:
$750,000 TO COMPLETE THE STUDY

LOCATION:



PROJECT SPOTLIGHT

7b: Raise Lower Bear Feasibility Study

MOKEWISE PROGRAM OBJECTIVES POTENTIALLY ACHIEVED BY THE PROJECT:

- Water Supply/Water Resources
- Water Quality
- Recreation
- Water Rights
- Flood Management
- Data
- Other Human Values
- Environment
- Agricultural Benefits
- Collaboration
- Avoids Consequences

BENEFITS POTENTIALLY ACHIEVED BY THE PROJECT:

- Municipal and industrial water supply
- Agricultural water supply
- Recreation
- Hydropower
- Nature tourism
- Energy costs
- Flood management
- Economic benefits
- Environmental enhancement and habitat restoration
- Improved source water quality

PROJECT SPOTLIGHT

7d: Re-operation of Existing Storage

DESCRIPTION:

The study will evaluate opportunities for re-operating and diversifying existing storage in PG&E's Mokelumne River Project (FERC No. 137) and in East Bay Municipal Utility District's two large storage reservoirs further downstream, consistent with the existing licenses, permits, legal agreements, legal decisions, and operating regimes that currently protect the river's water quality, cultural and historical resources, recreational uses, scenic values.

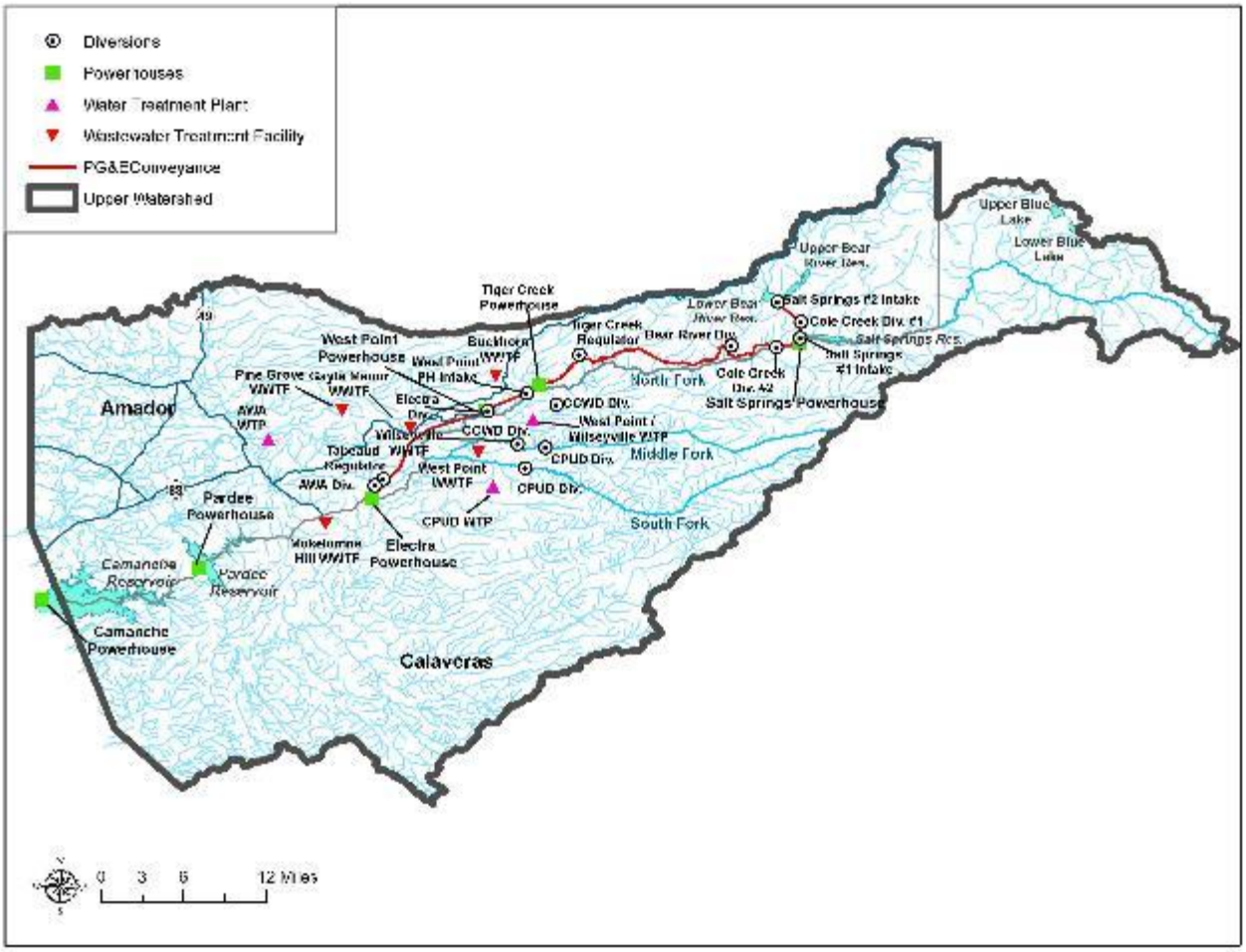
PROJECT:
RE-OPERATION OF EXISTING STORAGE

PROJECT TYPE:
STORAGE

SPONSOR(S):
UMRWA, CSPA (CO-SPONSOR)

ESTIMATED COSTS:
$750,000 TO COMPLETE THE STUDY

LOCATION:



PROJECT SPOTLIGHT

7d: Re-operation of Existing Storage

MOKEWISE PROGRAM OBJECTIVES POTENTIALLY ACHIEVED BY THE PROJECT:

- Water Supply/Water Resources
- Flood Management
- Data
- Other Human Values
- Agricultural Benefits
- Collaboration
- Avoids Consequences

BENEFITS POTENTIALLY ACHIEVED BY THE PROJECT:

- Municipal and industrial water supply
- Agricultural water supply
- Hydropower
- Nature tourism
- Energy costs
- Flood management
- Economic benefits
- Environmental enhancement and habitat restoration

PROJECT SPOTLIGHT

7f: Reliability and Replacement Assessment for Dams at Blue and Twin Lakes

PROJECT:
RELIABILITY AND REPLACEMENT ASSESSMENT FOR DAMS AT BLUE AND TWIN LAKES

PROJECT TYPE:
STORAGE

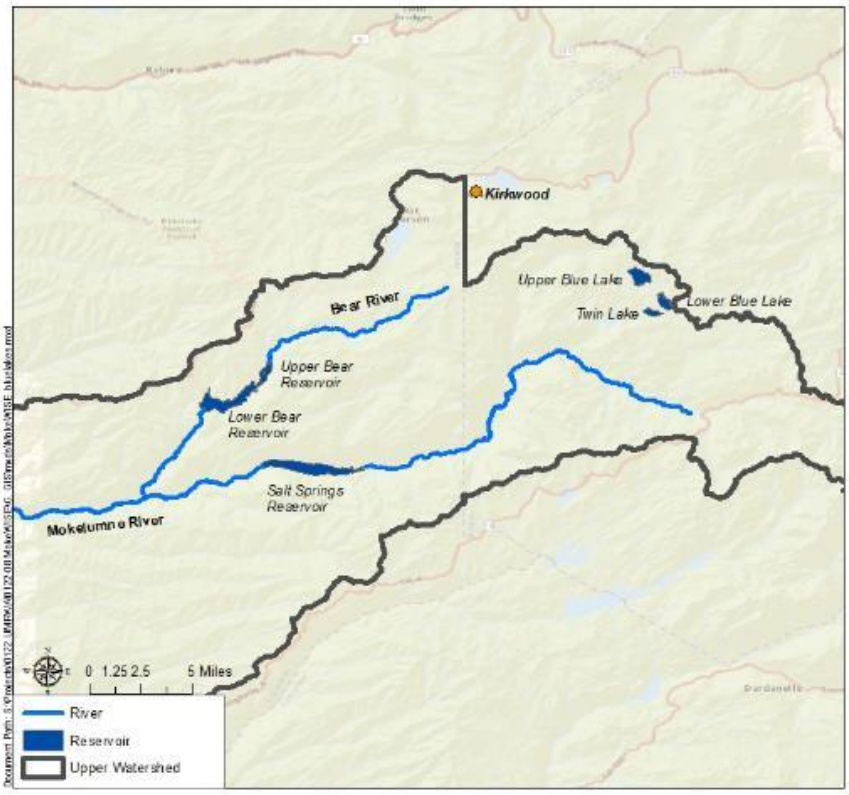
SPONSOR(S):
AWA

ESTIMATED COSTS:
$2,500,000 TO COMPLETE THE STUDY

DESCRIPTION:

Pacific Gas & Electric (PG&E) owns and operates Upper and Lower Blue and Twin Lakes Reservoirs. Total storage capacity of these three reservoirs is 13,176 AF. At present, PG&E nearly empties these reservoirs in the fall because of safety issues in the winter. In addition, all three of the dams on these lakes are classified as an ERRK (earth and rock) type by the California Division of Dam Safety, and could be at risk of failure during a seismic event. This study will evaluate potential to replace these old dams to achieve increased stability during an earthquake and to improve local water supply reliability by providing "carry-over" storage water through the winter.

LOCATION:



PROJECT SPOTLIGHT

7f: Reliability and Replacement Assessment for Dams at Blue and Twin Lakes

MOKEWISE PROGRAM OBJECTIVES POTENTIALLY ACHIEVED BY THE PROJECT:

- Water Supply/Water Resources
- Flood Management
- Data
- Other Human Values
- Agricultural Benefits
- Collaboration
- Avoids Consequences

BENEFITS POTENTIALLY ACHIEVED BY THE PROJECT:

- Municipal and industrial water supply
- Agricultural water supply
- Hydropower
- Nature tourism
- Energy costs
- Flood management
- Economic benefits
- Environmental enhancement and habitat restoration

PROJECT SPOTLIGHT

8b: Rehabilitation of Transmission Main

DESCRIPTION:

The Rehabilitation of Transmission Main Project will conduct a study to determine the benefits of replacing all or a portion of the transmission main that conveys treated water from the Jeff Davis Water Treatment Plant (WTP) to Mokelumne Hill, Paloma, and San Andreas. The study will include assessment of areas that are reaching life expectancy, areas of water loss, and recommendations for rehabilitation. Upon completion of the study, the project includes replacing or lining the recommended portions of the current transmission main.

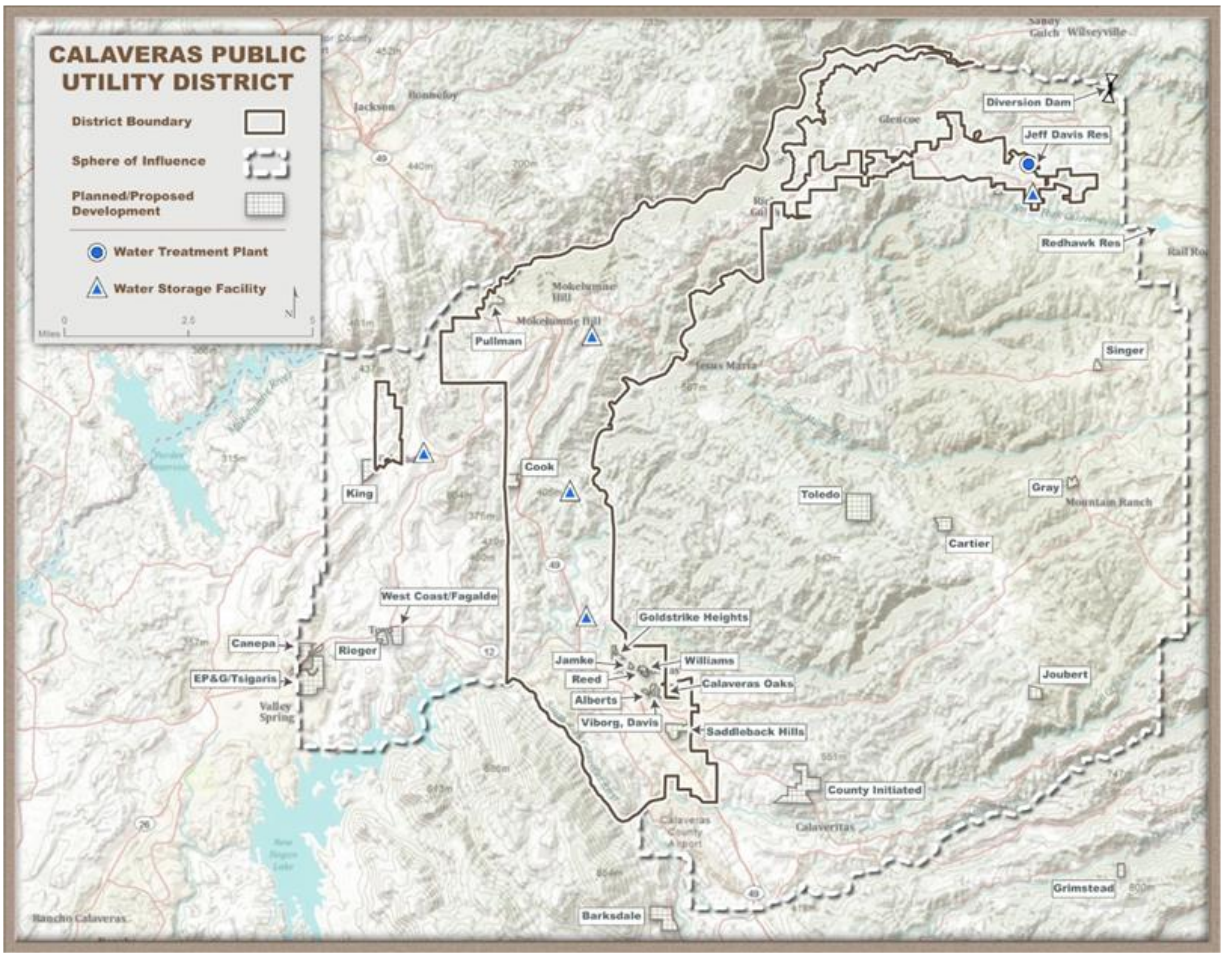
PROJECT:
REHABILITATION OF TRANSMISSION MAIN

PROJECT TYPE:
LOCAL INFRASTRUTURE

SPONSOR(S):
CPUD

ESTIMATED COSTS:
$1.03 MILLION (INCLDUES $30,000 FOR THE STUDY AND $1 MILLION FOR IMPLEMENTATION)

LOCATION:



PROJECT SPOTLIGHT

8b: Rehabilitation of Transmission Main

MOKEWISE PROGRAM OBJECTIVES POTENTIALLY ACHIEVED BY THE PROJECT:

- Water Supply/Water Resources
- Water Quality
- Data
- Other Human Values
- Environment
- Collaboration
- Avoids Consequences

BENEFITS POTENTIALLY ACHIEVED BY THE PROJECT:

- Municipal and industrial water supply
- Agricultural water supply
- Hydropower
- Nature tourism
- Energy costs
- Economic benefits
- Environmental enhancement and habitat restoration
- Improved source water quality

PROJECT SPOTLIGHT

8c: Barney Way Septic System Conversion

DESCRIPTION:

The Barney Way Septic System Conversion Project will convert 40 residences along Barney Way from individual septic systems either to a sanitary sewer, which would convey wastewater to the West Point treatment facility, or to a new community septic system. This would result in the decommissioning or abandoning of existing septic systems. The project includes conducting a preliminary evaluation to determine feasibility, engaging in public outreach, design, permitting, and construction.

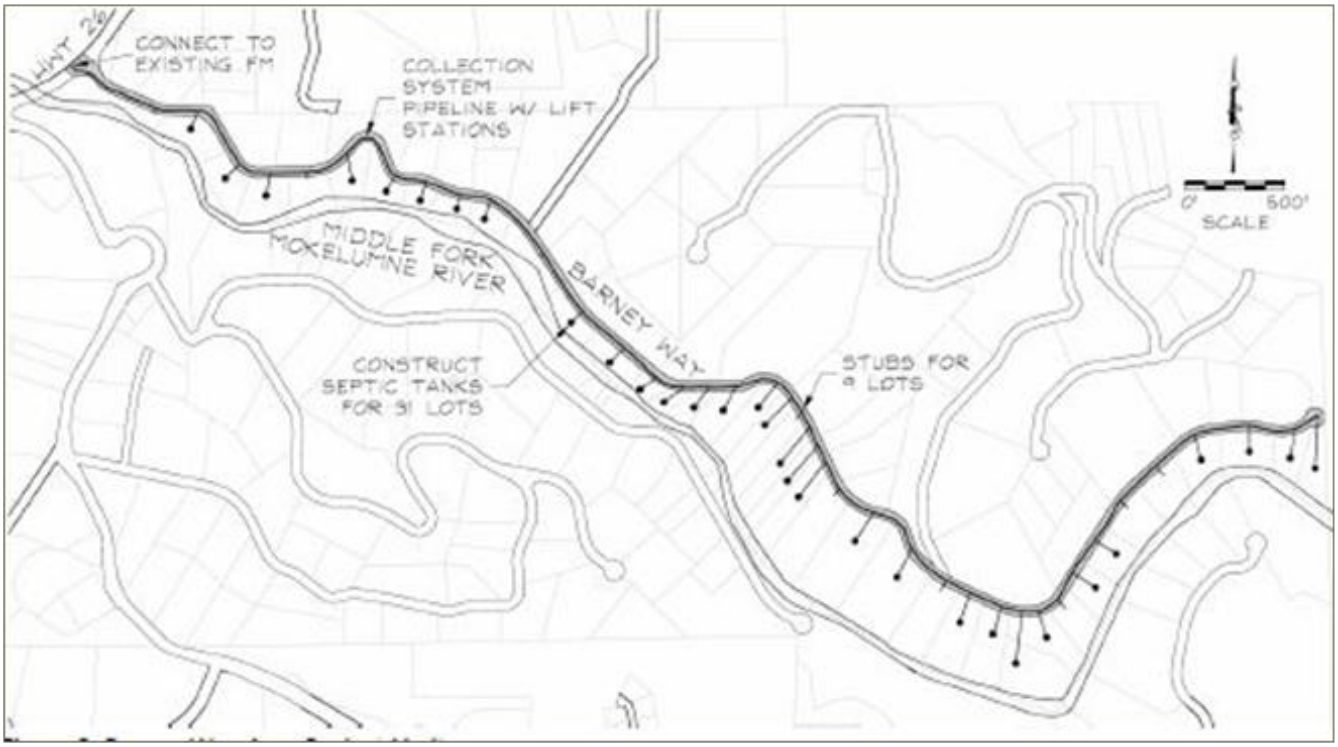
PROJECT:
BARNEY WAY SEPTIC SYSTEM CONVERSION

PROJECT TYPE:
LOCAL INFRASTRUTURE

SPONSOR(S):
CCWD

ESTIMATED COSTS:
$4.3 MILLION (INCLUDES PLANNING, ENGINEERING, CONSTRUCTION, AND A 10% CONTINGENCY)

LOCATION:



PROJECT SPOTLIGHT

8c: Barney Way Septic System Conversion

MOKEWISE PROGRAM OBJECTIVES POTENTIALLY ACHIEVED BY THE PROJECT:

- Water Quality
- Data
- Other Human Values
- Environment
- Collaboration
- Avoids Consequences

BENEFITS POTENTIALLY ACHIEVED BY THE PROJECT:

- Nature tourism
- Economic benefits
- Environmental enhancement and habitat restoration
- Improved source water quality

PROJECT SPOTLIGHT

8d: Lake Camanche Village Recycled Water Project

DESCRIPTION:

The Lake Camanche Village Recycled Water project will develop a study to explore the feasibility of upgrading the Lake Camanche Wastewater Treatment Plant (WWTP) to tertiary treatment and providing recycled water for local use. The feasibility study will include a treatment plant update assessment and demand assessment. The study would also identify project alternatives and conduct an alternatives assessment in order to select a preferred alternative.

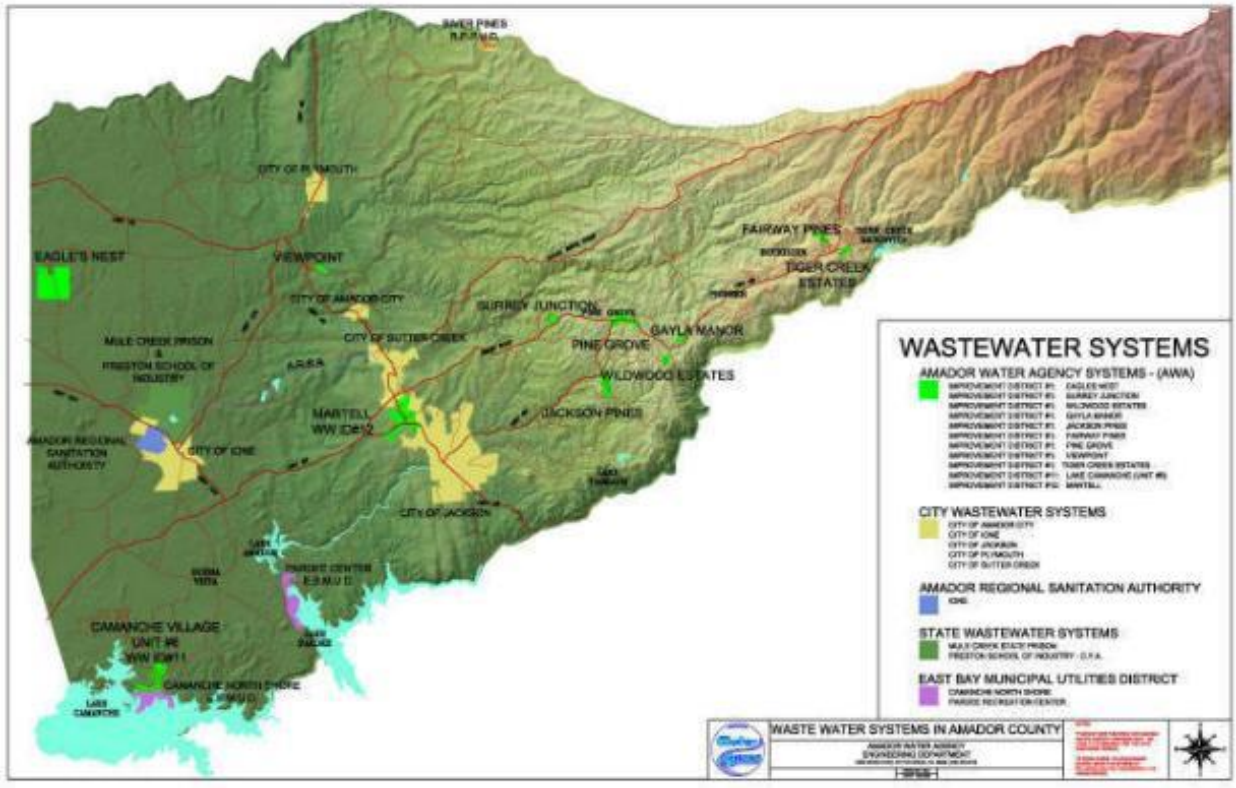
PROJECT:
LAKE CAMANCHE VILLAGE RECYCLED WATER PROJECT

PROJECT TYPE:
LOCAL INFRASTRUCTURE

SPONSOR(S):
AWA

ESTIMATED COSTS:
$150,000 FOR PLANNING

LOCATION:



PROJECT SPOTLIGHT

8d: Lake Camanche Village Recycled Water Project

MOKEWISE PROGRAM OBJECTIVES POTENTIALLY ACHIEVED BY THE PROJECT:

- Water Supply/Water Resources
- Water Quality
- Data
- Other Human Values
- Environment
- Agricultural Benefits
- Collaboration
- Avoids Consequences

BENEFITS POTENTIALLY ACHIEVED BY THE PROJECT:

- Municipal and industrial water supply
- Agricultural water supply
- Hydropower
- Nature tourism
- Energy costs
- Economic benefits
- Environmental enhancement and habitat restoration
- Improved source water quality

PROJECT SPOTLIGHT

Policies and Initiatives

POLICY 9A: LAND USE COORDINATION

Sponsors: CPC, MyValleySprings.com

Description: MokeWISE Stakeholders support a more defined and transparent approach to improving the coordination between willing water agencies and local land use agencies to ensure that there is adequate water supply to serve existing and future needs and the public interest.

POLICY 9B: SUSTAINABLE FOREST - WATERSHED MANAGEMENT PROJECT

Sponsor: none identified

Description: MokeWISE Stakeholders support the development and implementation of sustainable forestry practices within the upper portion(s) of the Mokelumne River Watershed. MokeWISE Stakeholders support the Amador-Calaveras Consensus Group's Principles and Policies to Guide Operation as adopted on August 18, 2010.

POLICY 9C: WATERSHED COORDINATOR

Sponsor: SJCRCD and UMRWA

Description: MokeWISE Stakeholders support funding efforts to retain one or more watershed coordinators to work under the direction of the San Joaquin County Resource Conservation District (lower watershed) and/or UMRWA (upper watershed) to facilitate collaborative interregional efforts to improve and sustain the health of the Mokelumne Watershed.

POLICY 9F: MOKEWISE PROJECT PUBLIC INVOLVEMENT INITIATIVE

Sponsor: UMRWA and the GBA

Description: MokeWISE stakeholders support ongoing participation of interested stakeholders and members of the public to oversee MokeWISE implementation and track implementation of individual MokeWISE projects. Continuing engagement with former Mokelumne Collaborative Group (MCG) members and the public on a regular basis constitutes an important element needed for success of MokeWISE projects.

PROGRAM COSTS AND ANTICIPATED BENEFITS

As discussed previously, MokeWISE projects and initiatives were identified for implementation in the MokeWISE program based on their ability to provide significant value to the Region. The projects, together, would achieve program objectives developed by the MCG and discussed in **Section 3** of this document.

The implementation projects that included implementation elements and had a well-defined project area underwent a preliminary cultural assessment. These projects included Project 1a (Re-Introduction of Fall-Run Chinook Salmon Upstream of Pardee Reservoir), Project 1c (Mokelumne River Day Use Area Floodplain Habitat Restoration Project), and Project 8b (Rehabilitation of Transmission Main).

A records search was performed on 8,400 acres and found that 34 cultural resource studies have been performed, which cover 37% of the 8,400 acre area. Results of the cultural assessment identify 24 archeological resources within this area. Of these, 17 are historic-era, four are pre-historic, and three contain both historic and prehistoric components. Most of the historic-era sites are related to mining activities and associated settlements along the Mokelumne River. In addition, the historic-era resources include a rock foundation, a bridge, a highway culvert, and historic landscaping. The prehistoric resources are primarily food production sites, with at least one site having a small habitation area. The three resources with both historic and prehistoric archeological deposits and features include remains from historic settlements, homesteads, and mining camp operations, built in area containing other prehistoric bedrock milling sites.

CEQA Guidelines require that the significance of potential project impacts to these cultural resources needs to be considered. Public agencies must avoid damaging effects on these cultural resources whenever feasible. If avoidance is not feasible, the significance of the resource shall be evaluated to determine impacts and develop mitigation measures.

In total, full implementation of the MokeWISE program would be expected to cost more than $100,000,000. Benefits of program implementation would be expected to include:

- Enhanced municipal and industrial water supply
- Enhanced agricultural water supply
- Improved recreation
- Increased hydropower generation
- Increased opportunities for nature tourism
- Reduced energy costs
- Improved flood management
- Local economic benefits

- Environmental enhancement and habitat restoration
- Improved source water quality

The **Table 10** summarizes anticipated project costs, type and extent of potential project benefits. Additional project information and analysis would be required to determine the extent and magnitude of benefits. Those projects with an asterisk are studies and do not have implementation components. For these projects, the benefits are estimated and assume implementation of study outcomes.

TABLE 10: ESTIMATED MOKEWISE PROJECT COSTS AND POTENTIAL BENEFITS

PROJECT	ESTIMATED PROJECT COST	MUNICIPAL AND INDUSTRIAL WATER SUPPLY	AGRICULTURAL WATER SUPPLY	RECREATION	HYDROPOWER	NATURE TOURISM	ENERGY COST	FLOOD MGMT	ECONOMIC BENEFITS	ENVIRONMENTAL ENHANCEMENT AND HABITAT RESTORATION	IMPROVED SOURCE WATER QUALITY
1a Re-Introduction of Fall-Run Chinook Salmon Upstream of Pardee Reservoir	$180,000 (includes $80,000 for planning and $100,000 for implementation)			✓		✓			✓	✓	
		The project would provide recreation benefits by increasing angling opportunities in the upper watershed. This could also create additional nature tourism opportunities. Increased tourism could provide economic benefits. The project will contribute to increased fish habitat in the upper watershed.									
1b High Country Meadow Restoration Program	$40,000 for assessment plus $10,000 per acre restored	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		The project would provide water supply benefits to municipal and agricultural customers by mitigating flood flows and increasing the portion of flood water able to be stored for later use. Increasing water in the system could provide hydropower benefits, which could lead to reduced energy costs. Reducing flood peaks could provide flood management benefits. Creation of new meadows could increase recreation and nature tourism opportunities. Increased tourism could provide economic benefits. The project would enhance the environment and habitat in the upper watershed by creating/restoring meadows. Water quality could be enhanced by greater natural filtration.										
1c Mokelumne River Day Use Area Floodplain Habitat Restoration Project	$150,000 (including $111,000 for implementation and 30% contingency)			✓		✓		✓	✓	✓	✓
		The project would restore floodplain downstream of Camanche Reservoir, thereby mitigating flood flows. Reducing flood peaks could provide flood management benefits. Creation of new meadows could increase recreation and nature tourism opportunities. Increased tourism could provide economic benefits. The project would enhance the environment and habitat in the upper watershed by restoring the floodplain. Water quality could be enhanced by greater natural filtration.									
1d Fish Screens for Riparian Diversions in the Lower Mokelumne	$300,000 for the preliminary assessment and prioritization plus $10,000 per cubic feet per second (cfs) of diversions screened	✓	✓	✓		✓			✓	✓	
		The project would increase supply reliability by assuring diverters that their use of the diversion would not be restricted due to potential impacts to fish. Implementing fish screens on currently unscreened lower Mokelumne River diversions would reduce entrapment and entrainment, leading to enhanced fish populations and associated recreation and nature tourism benefits. Increased tourism could provide economic benefits. By reducing entrapment and entrainment issues, the project would provide enhanced fish habitat.									
1f Riparian Restoration Program – Below Camanche	$10,000 for ranking and evaluation of proposed restoration sites plus $8,000 per acre restored	✓	✓	✓		✓		✓	✓	✓	✓
		The project provide groundwater recharge opportunities which would help water supply for municipal, industrial, and agricultural uses. The project would restore riparian habitat downstream of Camanche Reservoir, providing environmental restoration and potential flood management benefits. This could result in enhanced recreational opportunities associated with improved habitat and environmental conditions, and an associated increase in nature tourism. Increased tourism could provide economic benefits. Water quality could be enhanced by greater natural filtration.									
1g Mokelumne Water Quality, Soil Erosion, & Sedimentation Inventory/Monitoring	$1,080,000 for planning, inventory, mapping, assessment of erosion-sedimentation reduction options, prioritization, stakeholder coordination, publishing the results, and outreach	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		The project would improve water quality by addressing erosion and reduce sediment loading to the Mokelumne River. This could provide supply, flood management, and hydropower benefits by reducing reservoir siltation and reducing cost of filtering water for domestic use. Hydropower benefits could in turn lead to reduced energy costs. Improved water quality resulting from reduced sediment loading could result in improved habitat and associated nature tourism, as well as related recreational opportunities. Increased tourism could provide economic benefits.									
2a Municipal Recycled Wastewater Recharge Program	$150,000 for the feasibility study and $15 million for implementation	✓	✓						✓		✓
		Using recycled water provides a supply benefit by increasing overall supply availability. Recycled water can help reduce utility rates, which would provide an economic benefit. The project improves water quality by recharging the groundwater basin, which would dilute harmful constituents.									

TABLE 10: ESTIMATED MOKEWISE PROJECT COSTS AND POTENTIAL BENEFITS

PROJECT	ESTIMATED PROJECT COST	MUNICIPAL AND INDUSTRIAL WATER SUPPLY	AGRICULTURAL WATER SUPPLY	RECREATION	HYDROPOWER	NATURE TOURISM	ENERGY COST	FLOOD MGMT	ECONOMIC BENEFITS	ENVIRONMENTAL ENHANCEMENT AND HABITAT RESTORATION	IMPROVED SOURCE WATER QUALITY
2b Constellation Winery Wastewater Reuse	$35,000 for the conceptual design report, $100,000 for securing the Waste Discharge Report permit, $25,000 for securing funding, and $16 million for construction	✓	✓						✓	✓	✓
		Using recycled water provides a supply benefit by increasing overall supply availability. If recycled water use offsets Mokelumne River supplies, leaving additional supply in the river, the project could provide a recreational benefit associated with improving instream habitat. Increased recreation can provide an economic benefit. If the project reduces withdrawals from the Mokelumne River, there would be an environmental impact associated with greater instream flows. Greater instream flows would provide a water quality benefit.								
2c Amador County Regional Reuse	$400,000 for the refinement study and $21.35 million for implementation	✓	✓		✓		✓		✓		✓
		Using recycled water in the upper watershed provides a supply benefit by increasing overall supply availability and could provide hydropower benefits if the recycled water supply is used in lieu of Mokelumne River supply. If there is a hydropower benefit, this could result in reduced energy costs. Reduced energy costs can provide an economic benefit. If the project reduces withdrawals from the Mokelumne River, there could be a water quality benefit to the River associated with greater instream flows.								
4a Groundwater Banking within the Eastern San Joaquin Groundwater Basin*	$3,605,000 for study preparation	✓	✓	✓				✓	✓	✓	✓
		Implementing groundwater recharge could provide a supply benefit by increasing overall ability to store available supplies for use when needed. Having improved supply reliability provides a recreation benefit (and associated economic benefit) by potentially leaving additional supply in the Mokelumne River when being conveyed for groundwater storage. Increased groundwater levels can result in enhanced environmental conditions, which generates a recreation and nature tourism benefit. Managing flood flows for recharge could provide a flood management benefit. If the project reduces withdrawals from the Mokelumne River during certain year types, there could be a water quality benefit to the River associated with greater instream flows.								
4b Amador and Calaveras Counties Hydrologic Assessment*	$600,000 for study preparation	✓	✓	✓					✓	✓	✓
		Completing the hydrologic assessment could enable expanded groundwater use and/or groundwater banking in the upper watershed. Implementing groundwater recharge could provide a supply benefit by increasing overall ability to store available supplies for use when needed. Having improved supply reliability provides a recreation benefit (and associated economic benefit) by potentially leaving additional supply in the Mokelumne River when being conveyed for groundwater storage. Increased groundwater levels can result in enhanced environmental conditions, which generates a recreation and nature tourism benefit. If the project reduces withdrawals from the Mokelumne River during certain year types, there could be a water quality benefit to the River associated with greater instream flows.								
4d NSJWCD Infrastructure Improvements	$20,000,000 for implementation		✓						✓		✓
		The project would enable NSJWCD to use surface water in lieu of groundwater when it is available. This could provide a supply benefit by increasing overall ability offset groundwater pumping, which has associated economic benefits of reduced pumping. Increased groundwater levels can dilute constituents, which can result in increased water quality.								
5a Regional Urban Water Conservation Program	$80,000 (includes $60,000 for planning and $20,000 to prepare materials for a funding application)	✓			✓	✓	✓		✓	✓	✓
		Conserving water can reduce withdrawals from the Mokelumne River, providing a supply benefit by increasing overall supply availability and a potential hydropower benefit by reducing withdrawals from the Mokelumne River. If there is a hydropower benefit, this could result in reduced energy costs. Reducing River withdrawals could result in improved water quality associated with increased in stream flow and associated environmental and habitat improvement. Improved habitat could provide an increase in nature tourism and associated economic benefit.								
5b Regional Agriculture Conservation Program	$100,000 (includes $80,000 for planning and $20,000 to prepare materials for a funding application)		✓		✓	✓	✓		✓	✓	✓
		Conserving water can reduce withdrawals from the Mokelumne River, providing a supply benefit by increasing overall supply availability and a potential hydropower benefit by reducing withdrawals from the Mokelumne River. If there is a hydropower benefit, this could result in reduced energy costs. Reducing River withdrawals could result in improved water quality associated with increased in stream flow and associated environmental and habitat improvement. Improved habitat could provide an increase in nature tourism and associated economic benefit.								

TABLE 10: ESTIMATED MOKEWISE PROJECT COSTS AND POTENTIAL BENEFITS

PROJECT	ESTIMATED PROJECT COST	MUNICIPAL AND INDUSTRIAL WATER SUPPLY	AGRICULTURAL WATER SUPPLY	RECREATION	HYDROPOWER	NATURE TOURISM	ENERGY COST	FLOOD MGMT	ECONOMIC BENEFITS	ENVIRONMENTAL ENHANCEMENT AND HABITAT RESTORATION	IMPROVED SOURCE WATER QUALITY
7a PG&E Storage Recovery*	$350,000 for study preparation	✓	✓		✓	✓	✓	✓	✓	✓	
		Increasing existing storage by desilting reservoirs would provide a supply benefit by increasing available storage. Capturing additional supply could provide increased instream flows for fisheries and environmental purposes when needed. Improved environmental conditions could result in increased nature tourism. Ability to capture and manage flood flows would be enhanced with greater storage capability. In addition, hydropower operations could be enhanced, resulting in a potential decrease in energy costs, which could yield economic benefits.									
7b Raise Lower Bear Reservoir Feasibility Update and Preliminary Engineering*	$750,000 for study preparation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Increasing existing storage by raising Lower Bear Reservoir could provide a supply benefit by increasing available storage. Capturing additional supply could provide a recreational benefit by providing increased instream flows for fisheries and environmental purposes when needed. Improved environmental conditions could result in increased nature tourism. Increased instream flows could provide enhanced recreational opportunities and associated economic benefits. Ability to capture and manage flood flows would be enhanced with greater storage capability. In addition, hydropower operations could be enhanced, resulting in a potential decrease in energy costs.									
7d Re-operation of Existing Storage*	$750,000 for study preparation	✓	✓		✓	✓	✓	✓	✓	✓	
		Optimizing existing storage through reoperation of existing reservoirs could provide a supply benefit by increasing/optimizing available storage capacity. Capturing additional supply could provide a recreational benefit by providing increased instream flows for fisheries and environmental purposes when needed. Improved environmental conditions could result in increased nature tourism. Increased instream flows could provide enhanced recreational opportunities and associated economic benefits. Ability to capture and manage flood flows would be enhanced with greater storage capability. In addition, hydropower operations could be enhanced, resulting in a potential decrease in energy costs.									
7f Blue and Twin Lakes Dams Reliability and Replacement Assessment*	$2,500,000 for study preparation	✓	✓	✓	✓	✓	✓	✓	✓	✓	
		This project would reduce the possible earthquake risk associated with one or more of these dams and allow carryover storage, increasing supply reliability and available storage for the entire Mokelumne River system. This could provide a supply benefit by increasing available storage capacity. Capturing additional supply could increase instream flows for fisheries and environmental purposes when needed. Improved environmental conditions could result in increased nature tourism, recreation, and associated economic benefits. Ability to capture and manage flood flows would be enhanced with greater storage capability. In addition, hydropower operations could be enhanced, resulting in a potential decrease in energy costs.									
8b Rehab of Transmission Main	$1,030,000 ((includes $30,000 for planning and $1 million for implementation)	✓	✓		✓	✓	✓		✓	✓	✓
		Rehab of this transmission main would provide a water conservation benefit. Conserving water can reduce withdrawals from the Mokelumne River, providing a supply benefit by increasing overall supply availability and a potential hydropower benefit by reducing withdrawals from the Mokelumne River. If there is a hydropower benefit, this could result in reduced energy costs. Reducing River withdrawals could result in improved water quality associated with increased in stream flow and associated environmental and habitat improvement. Improved habitat could provide greater recreational opportunities and an increase in nature tourism and associated economic benefit.									
8c Barney Way Septic System Conversion	$4.3 million (includes planning, engineering, construction, and a 10% contingency)					✓			✓	✓	✓
		Reducing pollution to the Mokelumne River associated with failing onsite septic systems could provide a water quality benefit, which could in turn provide environmental and habitat improvements. These improvements could generate increased recreational and nature tourism opportunities and an associated economic benefit.									
8d Lake Camanche Village Recycled Water Project*	$150,000 for study preparation	✓	✓		✓	✓	✓		✓	✓	✓
		Using recycled water in the upper watershed provides a supply benefit by increasing overall supply availability and could provide hydropower benefits if the recycled water supply is used in lieu of Mokelumne River supply. If there is a hydropower benefit, this could result in reduced energy costs. If the recycled water offsets Mokelumne River supplies, leaving additional supply in the river, the project could increase recreation and provide an economic benefit. If the project reduces withdrawals from the Mokelumne River, there could be a water quality benefit to the River associated with greater instream flows.									

The benefits of implementing the MokeWISE program would be expected to accrue to a wide variety of parties, including the following.

- Amador Water Agency
- Calaveras County Water District
- Calaveras Public Utility District
- East Bay Municipal Utility District
- City of Lodi
- Jackson Valley Irrigation District
- North San Joaquin Water Conservation District
- City of Stockton
- Stockton East Water District
- Woodbridge Irrigation District
- San Joaquin County
- General public in the upper watershed
- General public in the lower watershed
- Natural environment in the upper watershed
- Natural environment in the lower watershed

Table 11 identifies which beneficiaries would be expected to receive the benefits identified above.

TABLE 11: POTENTIAL MOKEWISE PROJECT BENEFICIARIES

MOKEWISE PROJECT	POTENTIAL PROJECT BENEFICIARIES													
	AWA	CCWD	CPUD	EBMUD	CITY OF LODI	JVID	NSJ WCD	CITY OF STOCKTON	SEWD	WID	GENERAL PUBLIC IN THE UPPER WATERSHED	GENERAL PUBLIC IN THE LOWER WATERSHED	NATURAL ENVIRONMENT IN THE UPPER WATERSHED	NATURAL ENVIRONMENT IN THE LOWER WATERSHED
1a Re-Introduction of Fall-Run Chinook Salmon Upstream of Pardee Reservoir											✓	✓	✓	✓
1b High Country Meadow Restoration Program	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1c Mokelumne River Day Use Area Floodplain Habitat Restoration Project					✓		✓	✓	✓	✓		✓		✓
1d Fish Screens for Riparian Diversions in the Lower Mokelumne												✓		✓
1f Riparian Restoration Program – Below Camanche												✓		✓
1g Mokelumne Water Quality, Soil Erosion, & Sedimentation Inventory/Monitoring	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2a Municipal Recycled Wastewater Recharge Program					✓					✓		✓		✓
2b Constellation Winery Wastewater Reuse												✓		✓
2c Amador County Regional Reuse	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4a Groundwater Banking within the Eastern San Joaquin Groundwater Basin	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4b Amador and Calaveras Counties Hydrologic Assessment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4d NSJWCD Infrastructure Improvements							✓	✓	✓	✓		✓		✓
5a Regional Urban Water Conservation Program	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5b Regional Agriculture Conservation Program	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7a PG&E Storage Recovery	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7b Raise Lower Bear Reservoir Feasibility Update and Preliminary Engineering	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7d Re-operation of Existing Storage	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7f Blue and Twin Lakes Dams Reliability and Replacement Assessment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8b Rehab of Transmission Main	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8c Barney Way Septic System Conversion	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8d Lake Camanche Village Recycled Water Project	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

CLIMATE CHANGE BENEFITS

In addition to the benefits identified above, the implementation projects would be expected to provide significant climate change adaptation and mitigation benefits to the regions. **Table 12** summarize potential climate change adaptation and mitigation benefits projected to be generated through program implementation.

TABLE 12: POTENTIAL CLIMATE CHANGE BENEFITS

PROJECT	RELATED VULNERABILITIES	RMS IMPLEMENTED	GHG MITIGATION EFFECTS
1a. Re-Introduction of Fall-Run Chinook Salmon Upstream of Pardee Reservoir	• Impacted ecosystem and habitat	• Ecosystem Restoration • Water-Dependent Recreation •	• None
1b. High Country Meadow Restoration Program	• Degraded surface water and groundwater quality Impacted ecosystems and habitat	• Ecosystem Restoration • Recharge Area Protection • Watershed Management • Flood Risk Management	• Carbon Sequestration
1c. Mokelumne River Day Use Area Floodplain Habitat Restoration Project	• Increased flooding • Impacted ecosystem and habitat	• Ecosystem Restoration • Recharge Area Protection • Watershed Management • Flood Risk Management	• Carbon Sequestration
1d. Fish Screens for Riparian Diversions in the Lower Mokelumne River	• Impacted ecosystems and habitat	• Ecosystem Restoration • Watershed Management	• None
1f. Riparian Restoration Program – Below Camanche River	• Degraded surface water and groundwater quality Increased flooding • Impacted ecosystems and habitat	• Ecosystem Restoration • Recharge Area Protection • Watershed Management • Flood Risk Management	• Carbon Sequestration
1g. Mokelumne Water Quality, Soil Erosion & Sedimentation Inventory/ Monitoring	• Decreased surface water quality	• Sediment Management • Watershed Management	• None

TABLE 12: POTENTIAL CLIMATE CHANGE BENEFITS

PROJECT	RELATED VULNERABILITIES	RMS IMPLEMENTED	GHG MITIGATION EFFECTS
2a. Municipal Recycled Wastewater Recharge Program	• Decreased water supply/Water table decline • Degraded surface water and groundwater quality	• Conjunctive Management and Groundwater Storage • Recycled Municipal Water • Matching Quality to Use • Pollution Prevention	• Energy Efficiency • Emissions Reduction
2b.Woodbridge Winery Wastewater Reuse	• Decreased water supply • Degraded surface water and groundwater quality	• Conjunctive Management and Groundwater Storage • Recycled Municipal Water • Matching Quality to Use • Pollution Prevention	• Energy Efficiency • Emissions Reduction
2c. Amador County Reuse	• Decreased water supply • Degraded surface water and groundwater quality	• Recycled Municipal Water • Matching Quality to Use • Pollution Prevention	• Energy Efficiency • Emissions Reduction
4a. Groundwater Banking within the Eastern San Joaquin Groundwater Basin	• Decreased water supply/Water table decline • Degraded surface water and groundwater quality	• Water Transfers • Conjunctive Management and Groundwater Storage • Recharge Area Protection	• Energy Efficiency • Emissions Reduction
4b. Amador and Calaveras Counties Hydrologic Assessment	• Decreased water supply/Water table decline • Degraded surface and groundwater quality	• Water Transfers • Conjunctive Management and Groundwater Storage • Flood Risk Management	• Energy Efficiency • Emissions Reduction

TABLE 12: POTENTIAL CLIMATE CHANGE BENEFITS

PROJECT	RELATED VULNERABILITIES	RMS IMPLEMENTED	GHG MITIGATION EFFECTS
4d. NSJWCD Infrastructure Improvements	• Decreased water supply/Decreased water supply/Water table decline	• Conveyance – Regional/Local • Conjunctive Management and Groundwater Storage • Recharge Area Protection	• Energy Efficiency • Emissions Reduction
5a. Regional Urban Water Conservation Program	• Increased domestic/urban and commercial, industrial and institutional (CII) demands • Degraded surface water and groundwater quality	• Urban Water Use Efficiency • Matching Quality to Use • Pollution Prevention • Urban Runoff Management • Economic Incentives	• Energy Efficiency • Emissions Reduction
5b. Regional Agriculture Conservation Program	• Increased agricultural demands • Degraded surface water and groundwater quality	• Agricultural Water Use Efficiency	• Energy Efficiency • Emissions Reduction • Carbon Sequestration
7a. PG&E Storage Recovery	• Decreased water supply • Increased seasonal flooding	• Surface Storage – Regional/Local • Flood Risk Management	• Energy Efficiency • Emissions Reduction
7b. Raise Lower Bear Feasibility Study	• Decreased water supply • Increased seasonal flooding	• System Reoperation • Water Transfers • Conjunctive Management and Groundwater Storage • Surface Storage – Regional/Local • Watershed Management • Flood Risk Management	• Energy Efficiency • Emissions Reduction •
7d. Re-operation of Existing Storage	• Increased seasonal flooding • Reduced hydropower generation	• System Reoperation • Surface Storage – Regional/Local • Flood Risk Management	• Energy Efficiency • Emissions Reduction
7f. Blue & Twin Lakes Dams Reliability & Replacement Assessment	• Decreased water supply • Increased seasonal floods	• Surface Storage – Regional/Local • Flood Risk Management	• Energy Efficiency • Emissions Reduction

TABLE 12: POTENTIAL CLIMATE CHANGE BENEFITS

PROJECT	RELATED VULNERABILITIES	RMS IMPLEMENTED	GHG MITIGATION EFFECTS
8b. Rehabilitation of Transmission Main	• Decreased water supply	• Urban Water Use Efficiency • Conveyance – Regional/Local	• Energy Efficiency • Emissions Reduction
8c. Barney Way Septic System Conversion	• Decreased water supply • Degraded surface water and groundwater quality	• Pollution Prevention • Recharge Area Protection	• None
8d. Camanche Village Recycled Water Project	• Decreased water supply • Degraded surface water and groundwater quality	• Recycled Municipal Water • Matching Quality to Use • Pollution Prevention	• Energy Efficiency • Emissions Reduction

6 IMPLEMENTATION PLAN

Implementation Plan

As discussed in **Section 5**, the MCG implemented a multi-step process over a series of months to identify and develop projects that, together, have the potential to provide a significant range and magnitude of water resources benefits to the upper and lower watersheds. This section identifies the pathway to implement the MokeWISE Program. Key components of the implementation plan include:

- **Institutional Arrangements**. Following completion of the MokeWISE program development process, new institutional arrangements must be identified and implemented to oversee and further program implementation. This section provides an overview of the recommended institutional arrangements for program implementation as well as initial steps needed to implement the recommended arrangements.
- **Project Implementation Approach and Considerations**. Each project is currently at a different state of development and carries with it a unique set of requirements and considerations for implementation. This section identifies potential considerations for implementing the projects identified in the MokeWISE Program.

INSTITUTIONAL ARRANGEMENTS

To achieve MokeWISE Program implementation, it is necessary to establish an institutional arrangement capable of securing funding, and facilitating and overseeing project implementation. The institutional arrangement must have the following attributes:

1. Legal ability to apply for and accept state and other grant funding
2. Authority and administrative capacity to; enter into contracts, account for receipt and expenditure of funds, and implement water resource projects
3. Commitment to ensure continued opportunities for meaningful input from stakeholders and the public

The MCG considered six potential arrangement options for project implementation, including three inter-regional approaches and three bi-regional approaches centered on either a Joint Powers Authority (JPA) or MOU structure. The MCG formed a workgroup to recommend a preferred approach. Based on the workgroup's recommendations and subsequent discussion, the MCG identified that implementation structure which would potentially be most beneficial for project implementation while providing an appropriate level of involvement by key stakeholders and interested parties.

The MCG determined that the preferred approach would involve two main tiers of responsibility. One tier would be responsible for pursuing funding for and facilitating the

implementation of projects and programs (Implementation Tier), and the other tier would be responsible for providing input and serving in an advisory capacity to the implementation tier (Stakeholder and Public Involvement Tier). These tiers would be organized as follows.

Implementation Tier

The Implementation Tier of the proposed institutional arrangement would be achieved through an MOU between the GBA and UMRWA. The MOU would specify that the GBA and UMRWA would act as the lead agencies for soliciting, securing, and administering funding for projects being implemented in each of their regions, respectively. The MOU would characterize the roles and responsibilities of all the MOU signatories and would specify that project sponsors would be ultimately responsible for implementing their respective projects. Project sponsors and other governmental and non-governmental stakeholders would also be able to sign on to the MOU but would not be required to do so.

If funding were secured by UMRWA or the GBA for a project, a separate contractual agreement would be developed between UMRWA or GBA and the project sponsor, as appropriate, to clearly articulate the funding agreement terms, conditions, and requirements. It should be noted that being included in the MokeWISE implementation plan does not mean that a project cannot be initiated by a project sponsor independently from this process. It simply means that the project is a high priority for the region and that the institutional group, charged with implementing MokeWISE will lead or assist in pursuing funding for the project, as appropriate and in coordination with the project sponsor.

Stakeholder and Public Involvement Tier

The Stakeholder and Public Involvement Tier of the proposed institutional arrangement would engage at two levels of MokeWISE implementation.

At the region level, existing committees (the Regional Participants Committee in the MAC Region and the GBA Coordinating Committee in the ESJ Region) would advise the Implementation Tier on what projects to pursue funding for, changing needs for program implementation, etc. within each region.

At the inter-regional level, a MCG legacy stakeholder group will be co-hosted annually by the GBA and UMRWA. This MCG legacy stakeholder group would presumably include current MCG members and potentially other members not currently involved in the process, including individual members of the public. The legacy stakeholder group would adopt or adapt the MCG's protocols for decision-making and organization, and would meet at least annually to review MokeWISE implementation. Recommendations made by the legacy stakeholder group would be brought back to and considered by both the existing committees within each region and the Implementation Tier. As determined appropriate by

the MCG legacy stakeholder group, public workshops may be held to provide status updates and solicit input from the public on the projects being implemented, similar to those being held under the current structure used by the MCG.

The first step in implementing the institutional arrangement recommended by the MCG involves drafting an MOU outlining the roles and responsibilities of the individual parties. **Table 13** summarizes roles and responsibilities of each party involved in the institutional structure. Sample MOUs for several Regional Water Management Groups have been provided in **Appendix P** for use as a basis when developing an MOU for MokeWISE implementation.

TABLE 13: INSTITUTIONAL ARRANGEMENTS ROLES AND RESPONSIBILITIES

MEMBER	ROLE/REPONSIBILITIES
IMPLEMENTATION TIER	
UMRWA	• Enters into MOU with GBA to administer MokeWISE program implementation for upper watershed projects • Solicits input from stakeholders and public related to upper watershed MokeWISE implementation projects for grant funding • Pursues and administers grant funding for upper watershed MokeWISE implementation projects • Contracts with project sponsors to provide funding for implementation of upper watershed MokeWISE implementation projects • Reports to DWR on project implementation status for upper watershed projects on behalf of the project sponsors • Works with GBA to convene annual MCG legacy stakeholder group meetings
GBA	• Enters into MOU with UMRWA to administer MokeWISE program implementation for lower watershed projects • Solicits input from stakeholders and public related to lower watershed MokeWISE implementation projects for grant funding • Pursues and administers grant funding for lower watershed MokeWISE implementation projects • Contracts with project sponsors to provide funding for implementation of lower watershed MokeWISE implementation projects • Reports to DWR on project implementation status for lower watershed projects on behalf of the project sponsors • Works with UMRWA to convene annual MCG legacy stakeholder group meetings
Project Sponsors	• May sign onto MOU with UMRWA and GBA (optional) • Contract with UMRWA or GBA as appropriate to accept funding for implementation own project(s) • Implement projects for which funding has been secured
Other Entities	• May sign onto MOU with UMRWA and GBA (optional)

TABLE 13: INSTITUTIONAL ARRANGEMENTS ROLES AND RESPONSIBILITIES

MEMBER	ROLE/REPONSIBILITIES
STAKEHOLDER/PUBLIC OUTREACH TIER	
Stakeholder Organizations	• Participate on GBA and UMRWA region IRWM stakeholder committees and attend periodic stakeholder meetings and public workshops • Participate on the MCG legacy stakeholder group • Use internal networks to disseminate program-related information • Provide input related to implementation projects for grant funding
Members of the Public	• Participate on GBA and UMRWA region IRWM stakeholder committees and attend periodic stakeholder meetings (optional) • Participate on the MCG legacy stakeholder group • Attend public workshops • Use internal networks to disseminate program-related information • Provide input related to implementation projects for grant funding

It is recommended that UMRWA and the GBA undertake the following actions following completion of MokeWISE Program development to implement the institutional structure and continue program implementation (see **Table 14**).

TABLE 14: NEXT STEPS FOR INSTITUTIONAL ARRANGEMENT IMPLEMENTATION

ACTION	RESPONSIBLE PARTY(IES)	TARGET COMPLETION DATE
Meet to initiate MOU development	UMRWA and GBA	July 9, 2015
Draft MOU complete	UMRWA and GBA	August 9, 2015
Outreach to other potential signatories	UMRWA and GBA	September 9, 2015
UMRWA, GBA, and other signatories sign MOU	UMRWA, GBA, other signatories	December 31, 2015
Convene first annual MCG legacy stakeholder group meeting	UMRWA, GBA	June 2016

Implementing the actions identified above will establish the basis for continuing the MokeWISE Program beyond program development and into implementation.

PROJECT IMPLEMENTATION APPROACH AND CONSIDERATIONS

Section 6 identifies a suite of projects for implementation, which, taken together, constitute implementation of the MokeWISE Program. It is recognized that funding will be necessary to enable some or all of the implementation projects to move forward, and the main charge of the Implementation Tier will be to work with the project sponsors and the Stakeholder

and Public Involvement Tier to identify candidate projects for outside funding and to pursue funding to assist project sponsors in implementing those projects. There are several steps that must be completed for each planning and implementation project prior to moving forward. These are summarized below.

Funding Pursuit

As discussed previously, many of the projects identified in the MokeWISE Program require funding assistance to enable project implementation. The first step for these projects may be to secure funding for project implementation (or for project planning to proceed). Depending upon the type of funding programs open at any given time, the specific preferences of those funding programs, eligible project types, and quantities of funding available, some projects may be better aligned than others. The Implementation Tier will work with the project sponsors and the Stakeholder and Public Involvement Tier to identify appropriate funding mechanisms and projects for funding pursuit.

Planning and Assessment

Each project, prior to moving forward into design and preparing environmental documentation, requires preliminary assessment and planning. Preliminary assessment and planning provide the basis for determining whether a project is feasible for future implementation, and provides guidelines and basic information on how a project may proceed. Many of the projects included in the MokeWISE Program have some or no preliminary planning completed. Planning and assessment is a critical first step to determine how a project might proceed to provide benefits, and this must be completed prior to determining whether the project should be fully implemented.

Environmental Documentation

Some projects included in the implementation plan have environmental documentation in place, meeting the requirements of the CEQA/NEPA, and are ready to proceed. However, the majority of projects will require environmental documentation to be completed prior to implementing construction. Depending upon the project type (planning or implementation) and the funding source, environmental documentation may be required prior to becoming eligible for grant funding.

Design

Project design typically involves furthering assessment and planning work to develop detailed plans and specifications for how a project would be constructed. Design is often completed in increments such as 10 percent, 30 percent, 60 percent, and 90 percent, prior to completing final design and preparing bid documents suitable for contractors to bid on the work.

Construction Contracting

Following preparation of bid document, construction contracting involves entering into an agreement with the selected contractor to perform the work. This may also include resident engineering, in which an engineer is present on site during construction, overseeing and reviewing construction activities, and construction materials testing.

Permitting

In addition to environmental documentation, a variety of project-specific permits may be required prior to implementing construction. Examples permits from State and Federal agencies that may be required, depending upon the project in question are listed in **Table 15**. It should be noted that this is not an exhaustive list, but is intended to provide an overview of the type of permits that may be needed, depending upon the project being implemented.

TABLE 15: EXAMPLE STATE AND FEDERAL PERMITS POTENTIALLY REQUIRED

PERMITTING AUTHORITY	POTENTIAL PERMITS NEEDED
SWRCB	• Petition for Water Rights Transfer • Waste Discharge Requirements
Central Valley RWQCB	• General construction stormwater discharge permit • Permit under Section 401 of the Clean Water Act
California Department of Fish and Wildlife (DFW)	• Streambed Alteration Agreement under Fish and Wildlife Code Section 1602
Division of Drinking Water	• Treatment plant operating permit
Caltrans	• Encroachment Permit, if required
Army Corps of Engineers	• Permit under Section 404 of the Clean Water Act, if jurisdictional waters or wetlands affected • Permit under Section 10 of the Rivers and Harbors Act, if jurisdictional waters affected
US Fish and Wildlife Service	• Approval of incidental take permit under Section 10 of the federal ESA, if potential for effect on listed wildlife species • Consultation under Section 7 of the federal ESA, if Corps permit required and potential for effect on listed species
National Marine Fisheries Service (NMFS)	• Approval of incidental take permit under Section 10 (a)(1)(B) of the ESA, if potential for effect on listed marine life species
State Historic Preservation Office (SHPO)	• Possible compliance with Section 106 of the National Historic Preservation Act, if Corps permit required and potential for effect on cultural resources

Land Acquisition

Some projects may require purchase or acquisition of land for construction of facilities, maintenance easements, etc. Depending upon the location and purpose, land acquisition may be required prior to beginning construction.

Construction/Project Implementation

Assuming the project has environmental documentation and permits in place (as appropriate) and has funding available implementation, the next major step for project implementation is construction (or implementation if a planning project). Construction results in delivery of the completed project, including as-built drawings, completed facilities, and an inspection report. The general steps for construction implementation include:

Mobilization and Site Preparation: this step involves mobilization of the contractor's forces and equipment necessary for performing the work required to complete construction. It includes all activities for transportation of contractor's personnel, equipment, and operating supplies to the site; establishment of offices, buildings, and other necessary general facilities for the contractor's operations at the site. Site preparation includes completing work that is necessary to provide access to the site including, but not limited to, grading, temporary culverts, and clearing.

Project Construction: Construction includes implementing the building tasks necessary to install the project structures and features.

Performance Testing and Demobilization: Following construction and prior to startup of the completed project, performance testing may be necessary to demonstrate that the project was constructed and operates according to specifications. Following performance testing and acceptance, demobilization will be implemented. Demobilization involves demobilization of the contractor's forces and equipment once construction has been completed and accepted. It includes all activities for transportation of contractor's personnel, equipment, and operating supplies from the site.

Post-Construction Monitoring and Reporting

Depending upon the project and funding source, post-construction monitoring and periodic reporting may be required to demonstrate continued operation of the project consistent with planned operations, and to document that the claimed project benefits were, in fact, achieved. The type and extent of monitoring required will depend upon the type of project and specific funding source. Some DWR funding sources require 10 years of post-construction monitoring and reporting.

Table 16 lists the MokeWISE implementation plan projects and identifies remaining tasks that would need to be completed before the projects can be fully implemented.

TABLE 16: STAGES REMAINING TO COMPLETE MOKEWISE PROJECT IMPLEMENTATION

MOKEWISE IMPLEMENTATION PROJECT	PROJECT STAGES COMPLETED							
	FUNDING	PLANNING	ENVIRONMENTAL DOCUMENTATION	DESIGN	PERMITTING	LAND ACQUISITION	CONSTRUCTION	POST-CONSTRUCTION MONITORING
1a Re-Introduction of Fall-Run Chinook Salmon Upstream of Pardee Reservoir	○	◗	○	○	○	○	○	○
1b High Country Meadow Restoration Program	○	◗	○	○	○	○	○	○
1c Mokelumne River Day Use Area Floodplain Habitat Restoration Project	○	○	○	○	○	○	○	○
1d Fish Screens for Riparian Diversions in the Lower Mokelumne	○	◗	○	○	○	○	○	○
1f Riparian Restoration Program – Below Camanche	○	◗	○	○	○	○	○	○
1g Mokelumne Water Quality, Soil Erosion, & Sedimentation Inventory/Monitoring	○	○	○	○	○	○	○	○
2a Municipal Recycled Wastewater Recharge Program	○	●	○	○	○	○	○	○
2b Constellation Winery Wastewater Reuse	○		○	○	○	○	○	○
2c Amador County Regional Reuse	○	●	○	○	○	○	○	○
4a Groundwater Banking within the Eastern San Joaquin Groundwater Basin	○	○	○	○	○	○	○	○
4b Amador and Calaveras Counties Hydrologic Assessment	○	○	○	○	○	○	○	○
4d NSJWCD Infrastructure Improvements	○	●	●	○	○	○	○	○
5a Regional Urban Water Conservation Program	○	○	○	○	○	○	○	○
5b Regional Agriculture Conservation Program	○	○	○	○	○	○	○	○
8b Rehab of Transmission Main	○	●	○	○	○	○	○	○
8c Barney Way Septic System Conversion	○	○	○	○	○	○	○	○
8d Lake Camanche Village Recycled Water Project	○	○	○	○	○	○	○	○
7a PG&E Storage Recovery	○	○	○	○	○	○	○	○
7b Raise Lower Bear Reservoir Feasibility Update and Preliminary Engineering	○	◗	○	○	○	○	○	○
7d Re-operation of Existing Storage	○	○	○	○	○	○	○	○
7f Blue and Twin Lakes Dams Reliability and Replacement Assessment	○	○	○	○	○	○	○	○

○ = no/limited work completed

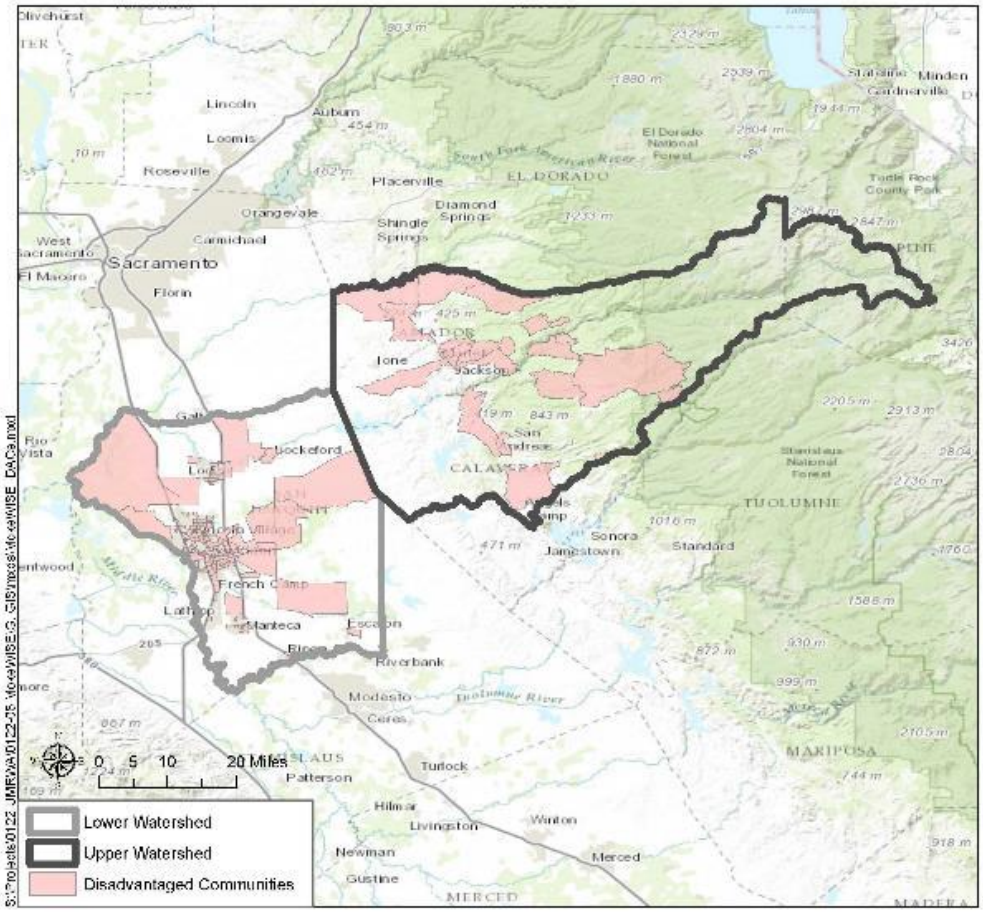
◗ = some degree of work completed

● = project stage completed

FUNDING AND FINANCING STRATEGY

Conceptual-level estimates of capital costs were developed for the projects included in the MokeWISE Program. For some projects, operations and maintenance costs were also developed. These costs, together, are expected to total more than $100,000,000. In many cases, these costs reflect only the cost to complete the planning or feasibility study; as such, the actual cost to implement all of the identified projects and therefore realize all of the potential program benefits would be significantly greater than this estimate. Some projects may be able to be partially funded from existing revenue sources. However, some projects are expected to require additional or alternate funding sources for all project costs. Further, while some projects may funded in part by existing revenue sources, many areas within the MAC and ESJ Regions are severely disadvantaged, and any incremental increase in utility rates due to implementation of new projects or programs could constitute an economic hardship (see **Figure 9**). As such, it is expected that a high degree of outside funding will be necessary to implement the MokeWISE program.

Figure 9: Disadvantaged Communities in the MokeWISE Study Area



Funding and Financing Approach

As discussed previously, the Implementation Tier will be tasked with working with project sponsors and the Stakeholder and Public Involvement Tier to identify potential projects for funding. In order to do this effectively, the Implementation Tier will need to stay abreast of the various funding programs available to implement different project types.

At the State level, the November 2014 passage of Proposition 1 will result in an influx in State funding to support much-needed water projects statewide. Proposition 1 authorizes $7.54B for implementation of water projects, including $7.12B in new funds, combined with $420M repurposed from existing bonds (84, 50, 13, 204, 44, and 1E). The $7.54 B in funding is allocated to the following general project categories:

- Storage: $2,700 M
- Statewide Flood Management: $395 M
- Watershed Protection/Ecosystems: $1,495 M
- Groundwater Sustainability: $900 M
- Water Recycling: $725 M
- Safe Drinking Water: $520 M
- Regional Water Reliability: $810 M

These categories cover the full range of projects types represented in the MokeWISE Program, and the funds could potentially offset a significant portion of the cost to implement the recommended projects.

In order to track and pursue funding through Proposition 1 for project implementation, it must be recognized that Proposition 1 funding is being administered by a host of state agencies, departments, board, councils, and conservancies along a series of different timelines, with different requirements for each funding opportunity. **Table 17**, adapted from the Governor's Bond Accountability webpage, identifies the various implementing entities and the respective implementation schedules. This table also identifies the general category of project types anticipated to be funded by each opportunity.

TABLE 17: PROPOSITION 1 2015 PROGRAM DEVELOPMENT TIMELINE AND POTENTIAL MOKEWISE PROJECT ELIGIBILITY

ADMINISTERING ENTITY	NAME OF PROGRAM	POTENTIALLY ELIGIBLE MOKEWISE PROJECT TYPES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
SWRCB	Small Community Wastewater	Recycled Water Local Infrastructure		Draft GLs. Released	Public Workshops			Final GLs.; Grant Solicitation Ongoing						
SWRCB	Clean, Safe and Reliable Drinking Water	Recycled Water Desalination Groundwater Conservation Surface Water Local Infrastructure				Draft GLs. Released	Public Work-shops			Final GLs. Solicit. Ongoing				
Baldwin Hills Conservancy	Ballona Creek/ Baldwin Hills Watershed Program	-		Draft GLs. to Board (2/27)		Public Workshops Final GLs. Review by CNRA	Board Adoption (5/22)							
Tahoe Conservancy	Ecosystem and Watershed Protection and Restoration Program in the Lake Tahoe Basin	-	Draft to GLs. Board		Public Work-shops	Final GLs. Rev. by CNRA; Board Update/ Adoption (4/23)		Board Adoption (6/18, if necessary)						
Coachella Valley Mountains Conservancy	Coachella Valley Multibenefit Ecosystem and Watershed Protection and Restoration Projects Grant Program	-	Draft GLs. Outline to Board (1/12)		Draft GLs. to Board/ Public Work-shops	Final GLs. Review by CNRA	Board Adoption (5/12)							
Ocean Protection Council	Proposition 1 Grant Program	-									Final GLs.		Grant Solicitation	
San Diego River Conservancy	Water Quality and Supply, Watershed Restoration and Habitat Enhancement Program	-			Draft GLs. to Board	Public Workshops								
San Gabriel and Lower LA Rivers and Mountains Conservancy	Multibenefit Water Quality, Water Supply, and Watershed Protection and Restoration Program	-			Draft GLs. to Board	Public Workshops	Final GLs. Review by CNRA; Board Adoption	Grant Solicitation			Review of Apps.		Grant Award Rec. to the Board	

TABLE 17: PROPOSITION 1 2015 PROGRAM DEVELOPMENT TIMELINE AND POTENTIAL MOKEWISE PROJECT ELIGIBILITY

ADMINISTERING ENTITY	NAME OF PROGRAM	POTENTIALLY ELIGIBLE MOKEWISE PROJECT TYPES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
San Joaquin River Conservancy	San Joaquin River Conservancy Multi-Benefit Watershed Protection and Restoration Program	Ecosystem/ Habitat Restoration Stormwater/ Flood Protection		Draft GLs. to Board (2/18)/ Draft GLs. Released	Draft GLs. to Board (3/18)	Public Workshops	Final GLs. Review by CNRA	Board Adoption (6/17)						
Santa Monica Mountains Conservancy	Multibenefit Water Quality, Water Supply, and Watershed Protection and Restoration Program	-	In process of being developed											
Sierra Nevada Conservancy	Sierra Nevada Watershed Improvement Program	Ecosystem/ Habitat Restoration Stormwater/ Flood Protection		Draft GLs. Released (2/6)	Draft GLs. to Board (3/4); Public workshops	Final GLs. Review by CNRA		Board Adoption (6/4)	RFP issued					
Coastal Conservancy	Proposition 1 Grant Program	-	Draft GLs. to Board (1/29)		Public Workshops	Final GLs. Review by CNRA		Board Adoption (6/25)						
Sacramento-San Joaquin Delta Conservancy	Proposition 1 Grant Program	Ecosystem/ Habitat Restoration Stormwater/ Flood Protection			Draft GLs. to Board (3/25)		Public Work-shops	Final GLs. Review by CNRA		Board Adoption (08/26, preferred)				
Wildlife Conservation Board	Stream Flow Enhancement Program	Ecosystem/ Habitat Restoration Stormwater/ Flood Protection		Draft to GLs. Board (2/26)		Public Workshops; Final GLs. Review by CNRA	Board Adoption (5/21)							
Santa Monica Mountains Conservancy and San Gabriel and Lower LA Rivers and Mountains Conservancy	An Urban Creek	-	In process of being developed											
Natural Resources Agency	Watershed and Urban River Enhancements Program	Ecosystem/ Habitat Restoration Stormwater/ Flood Protection	Finishing two current grant cycles and starting Prop 1 program development, including assembling team of various departments/ conservancies											
Natural Resources Agency	State Obligations	-	In process of being developed											

TABLE 17: PROPOSITION 1 2015 PROGRAM DEVELOPMENT TIMELINE AND POTENTIAL MOKEWISE PROJECT ELIGIBILITY

ADMINISTERING ENTITY	NAME OF PROGRAM	POTENTIALLY ELIGIBLE MOKEWISE PROJECT TYPES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Dept. of Fish and Wildlife	Watershed Restoration and Delta Water Quality and Ecosystem Restoration Grant Programs	Ecosystem/ Habitat Restoration Stormwater/ Flood Protection	Draft GLs.; Initial Guideline Review by CNRA	Draft GLs. Released		Public Workshops; Final GLs. Review by CNRA	Final GLs.		Grant Solicit.					
DWR	Integrated Regional Water Management	ALL TYPES	Tribal Consultation, Develop Economically Distressed Area definitions/ tool, Develop Program Success Measures (NOTE: Final round of Prop 84 $220m dollars for IRWM to be awarded first)						Public Scoping Meetings to get Input					Post Draft GLs. & PSP for IRWM Planning Grant Program
DWR	Water Use and Efficiency Grants, Round 1 - Urban and Ag	Recycled Water Conservation Local Infrastructure							Post draft GLs. and PSP	Public meetings	Develop and post FAQs	CNRA review		Post final GLs. and PSP
SWRCB	Stormwater	Stormwater/ Flood Protection	In process of being developed											
Water Commission	Water Storage Investment Program	Storage Groundwater	Develop Draft Regulation Package (Commission oversight via monthly meetings)									Submit draft reg.	Public Comment Period	
			Stakeholder Advisory Group Engagement											
			Tribal Consultation											
SWRCB	Water Recycling	Recycled Water Local Infrastructure		Draft GLs. Released		Public Workshops		Final GLs.; Grant Solicitation Ongoing						
SWRCB	Groundwater Sustainability	Groundwater		In process of being developed										
DWR	Groundwater Plans and Project Grant Program - Phase 1	Groundwater			Tribal Consultation, Develop Economically Distressed Area definitions/ tools, Develop Program Success Measures									Draft GLs. & PSP for GW Grant Program/ Public Comment Period
					Public Scoping Meetings to get Input									
DWR and Central Valley Flood Protection Board	Flood Management	Stormwater/ Flood Protection	In process of being developed											

Based on the Proposition 1 funding schedule and identification of potentially-eligible MokeWISE project types, it is recommended that the Implementation Tier review and track development of each proposal solicitation process. Upon program guidelines being published, the Implementation Tier should consult with the project sponsors and the Stakeholder and Public Involvement Tier to determine which whether any projects may be eligible and should be considered for funding pursuit. Based on this assessment, UMRWA and the GBA should determine whether to pursue funding from each solicitation for upper and/or lower watershed MokeWISE projects, respectively, and for suitable bi-regional projects.

Table 18 summarizes the anticipated costs for each project and identifies whether potential water and/or wastewater rates may be available to offset a portion of the project **Table 17** cost. In addition, this table identifies which Proposition 1 program or programs identified in should be evaluated for their ability to provide additional potential funding for each project.

TABLE 18: ESTIMATED MOKEWISE PROJECT COSTS AND POTENTIAL FUNDING SOURCES

PROJECT	GENERAL PROJECT TYPE	ESTIMATED PROJECT COST	POTENTIAL FOR WATER/WASTE WATER RATE FUNDING?	POTENTIAL PROPOSITION 1 FUNDING OPPORTUNITIES										
				SWRCB - SMALL COMMUNITY WASTEWATER	SWRCB - CLEAN, SAFE AND RELIABLE DRINKING WATER	SAN JOAQUIN RIVER CONSERVANCY – SJR CONSERVANCY MULTI-BENEFIT WATERSHED PROTECTION AND RESTORATION	SIERRA NEVADA CONSERVANCY - SIERRA NEVADA WATERSHED IMPROVEMENT PROGRAM	SACRAMENTO-SAN JOAQUIN DELTA CONSERVANCY - PROPOSITION 1 GRANT PROGRAM	WILDLIFE CONSERVATION BOARD - STREAM FLOW ENHANCEMENT PROGRAM	NATURAL RESOURCES AGENCY - WATERSHED AND URBAN RIVER ENHANCEMENTS PROGRAM	DEPT. OF FISH AND WILDLIFE - WATERSHED RESTORATION AND DELTA WATER QUALITY AND ECOSYSTEM RESTORATION GRANT PROGRAMS	DEPT OF WATER RESOURCES - INTEGRATED REGIONAL WATER MANAGEMENT	DEPT OF WATER RESOURCES - WATER USE AND EFFICIENCY GRANTS, ROUND 1 - URBAN AND AG	SWRCB - STORMWATER	WATER COMMISSION - WATER STORAGE INVESTMENT PROGRAM	SWRCB - WATER RECYCLING	SWRCB - GROUNDWATER SUSTAINABLITY	DWR - GROUNDWATER PLANS AND PROJECT GRANT PROGRAM - PHASE 1	DWR AND CENTRAL VALLEY FLOOD PROTECTION BOARD - FLOOD MANAGEMENT
1a Re-Introduction of Fall-Run Chinook Salmon Upstream of Pardee Reservoir	Ecosystem/ Habitat Protection	$180,000 (includes $80,000 for planning and $100,000 for implementation)	N			✓	✓	✓	✓	✓	✓	✓						
1b High Country Meadow Restoration Program	Ecosystem/ Habitat Protection	$40,000 for assessment plus $10,000 per acre restored	N			✓	✓	✓	✓	✓	✓	✓						
1c Mokelumne River Day Use Area Floodplain Habitat Restoration Project	Ecosystem/ Habitat Protection	$150,000 (including $111,000 for implementation and 30% contingency)	Y			✓	✓	✓	✓	✓	✓	✓						
1d Fish Screens for Riparian Diversions in the Lower Mokelumne	Ecosystem/ Habitat Protection	$300,000 for the preliminary assessment and prioritization plus $10,000 per cfs of diversions screened	N			✓	✓	✓	✓	✓	✓	✓						
1f Riparian Restoration Program – Below Camanche	Ecosystem/ Habitat Protection	$10,000 for ranking and evaluation of proposed restoration sites plus $8,000 per acre restored	N			✓	✓	✓	✓	✓	✓	✓						✓
1g Mokelumne Water Quality, Soil Erosion, & Sedimentation Inventory/Monitoring	Ecosystem/ Habitat Protection	$1,080,000 for planning, inventory, mapping, assessment of erosion-sedimentation reduction options, prioritization, stakeholder coordination, publishing the results, and outreach	N			✓	✓	✓	✓	✓	✓	✓						✓
2a Municipal Recycled Wastewater Recharge Program	Recycled Water	$150,000 for the feasibility study and $15 million for implementation	Y	✓								✓		✓				

TABLE 18: ESTIMATED MOKEWISE PROJECT COSTS AND POTENTIAL FUNDING SOURCES

PROJECT	GENERAL PROJECT TYPE	ESTIMATED PROJECT COST	POTENTIAL FOR WATER/WASTE WATER RATE FUNDING?	POTENTIAL PROPOSITION 1 FUNDING OPPORTUNITIES																
				SWRCB - SMALL COMMUNITY WASTEWATER	SWRCB - CLEAN, SAFE AND RELIABLE DRINKING WATER	SAN JOAQUIN RIVER CONSERVANCY – SJR CONSERVANCY MULTI-BENEFIT WATERSHED PROTECTION AND RESTORATION	SIERRA NEVADA CONSERVANCY - SIERRA NEVADA WATERSHED IMPROVEMENT PROGRAM	SACRAMENTO-SAN JOAQUIN DELTA CONSERVANCY - PROPOSITION 1 GRANT PROGRAM	WILDLIFE CONSERVATION BOARD - STREAM FLOW ENHANCEMENT PROGRAM	NATURAL RESOURCES AGENCY - WATERSHED AND URBAN RIVER ENHANCEMENTS PROGRAM	DEPT. OF FISH AND WILDLIFE - WATERSHED RESTORATION AND DELTA WATER QUALITY AND ECOSYSTEM RESTORATION GRANT PROGRAMS	DEPT OF WATER RESOURCES - INTEGRATED REGIONAL WATER MANAGEMENT	DEPT OF WATER RESOURCES - WATER USE AND EFFICIENCY GRANTS, ROUND 1 - URBAN AND AG	SWRCB - STORMWATER	WATER COMMISSION - WATER STORAGE INVESTMENT PROGRAM	SWRCB - WATER RECYCLING	SWRCB - GROUNDWATER SUSTAINABLITY	DWR - GROUNDWATER PLANS AND PROJECT GRANT PROGRAM - PHASE 1	DWR AND CENTRAL VALLEY FLOOD PROTECTION BOARD - FLOOD MANAGEMENT
2b Constellation Winery Wastewater Reuse	Recycled Water	$35,000 for the conceptual design report, $100,000 for securing the Waste Discharge Report permit, $25,000 for securing funding, and $16 million for construction	Y	✓	✓								✓				✓			
2c Amador County Regional Reuse	Recycled Water	$400,000 for the refinement study and $21.35 million for implementation	Y	✓	✓								✓				✓			
4a Groundwater Banking within the Eastern San Joaquin Groundwater Basin	Groundwater	$3,605,000 for study	Y		✓								✓		✓	✓		✓	✓	✓
4b Amador and Calaveras Counties Hydrologic Assessment	Groundwater	$600,000 for study	Y		✓								✓			✓		✓	✓	
4d NSJWCD Infrastructure Improvements	Groundwater	$20,000,000 for implementation	Y		✓								✓					✓	✓	✓
5a Regional Urban Water Conservation Program	Water Conservation	$80,000 (includes $60,000 for planning and $20,000 to prepare materials for a funding application)	Y		✓								✓	✓						
5b Regional Agriculture Conservation Program	Water Conservation	$100,000 (includes $80,000 for planning and $20,000 to prepare materials for a funding application)	Y		✓								✓	✓						
8b Rehab of Transmission Main	Water Conservation	$5.2 million (includes $200,000 for the study and $5 million for implementation)	Y										✓	✓						
8c Barney Way Septic System Conversion	Ecosystem/ Habitat Protection	$4.3 million (includes planning, engineering, construction, and a 10% contingency)	N	✓	✓	✓	✓	✓	✓	✓	✓		✓							
8d Lake Camanche Village Recycled Water Project	Recycled Water	$150,000 for study completion	Y	✓	✓								✓				✓			
7a PG&E Storage Recovery	Storage	$350,000 for study preparation	Y		✓								✓			✓				

TABLE 18: ESTIMATED MOKEWISE PROJECT COSTS AND POTENTIAL FUNDING SOURCES

PROJECT	GENERAL PROJECT TYPE	ESTIMATED PROJECT COST	POTENTIAL FOR WATER/WASTE WATER RATE FUNDING?	POTENTIAL PROPOSITION 1 FUNDING OPPORTUNITIES														
				SWRCB - SMALL COMMUNITY WASTEWATER	SWRCB - CLEAN, SAFE AND RELIABLE DRINKING WATER	SAN JOAQUIN RIVER CONSERVANCY – SJR CONSERVANCY MULTI-BENEFIT WATERSHED PROTECTION AND RESTORATION	SIERRA NEVADA CONSERVANCY - SIERRA NEVADA WATERSHED IMPROVEMENT PROGRAM	SACRAMENTO-SAN JOAQUIN DELTA CONSERVANCY - PROPOSITION 1 GRANT PROGRAM	WILDLIFE CONSERVATION BOARD - STREAM FLOW ENHANCEMENT PROGRAM	NATURAL RESOURCES AGENCY - WATERSHED AND URBAN RIVER ENHANCEMENTS PROGRAM	DEPT. OF FISH AND WILDLIFE - WATERSHED RESTORATION AND DELTA WATER QUALITY AND ECOSYSTEM RESTORATION GRANT PROGRAMS	DEPT OF WATER RESOURCES - INTEGRATED REGIONAL WATER MANAGEMENT	DEPT OF WATER RESOURCES - WATER USE AND EFFICIENCY GRANTS, ROUND 1 - URBAN AND AG	SWRCB - STORMWATER	WATER COMMISSION - WATER STORAGE INVESTMENT PROGRAM	SWRCB - WATER RECYCLING	SWRCB - GROUNDWATER SUSTAINABLITY	DWR - GROUNDWATER PLANS AND PROJECT GRANT PROGRAM - PHASE 1	DWR AND CENTRAL VALLEY FLOOD PROTECTION BOARD - FLOOD MANAGEMENT
7b Raise Lower Bear Reservoir Feasibility Update and Preliminary Engineering	Storage	$750,000 for study preparation	Y		✓								✓			✓			
7d Re-operation of Existing Storage	Storage	$750,000 for study preparation	Y		✓								✓			✓			
7f Blue and Twin Lakes Dams Reliability and Replacement Assessment	Storage	$2,500,000 for study preparation	Y		✓								✓			✓			

7 IRWM PLAN INTEGRATION

IRWM Plan Integration

This program was developed as a joint effort among the MAC and ESJ IRWM Regions. As discussed previously, the intent is not to supersede either of the regional plans but to coalesce them into an interregional plan. Portions of this program may be incorporated into the individual regional plans to augment those individual plans. The integration section, provided as **Appendix Q**, summarizes information from the MokeWISE Program that could be integrated into the regional plans. Appending the integration section to the MAC and ESJ IRWM Plans is intended to functionally integrate this program into each respective regional effort.

The Integration section addresses the following IRWM sections.

- Governance – the institutional arrangements for implementing MokeWISE, as identified in the implementation section of this document, are described to supplement the Governance sections of the existing plans.
- Region Description – water supply, water quality, and environmental resources information developed through MokeWISE is be summarized to augment the information included in each IRWM Plan.
- Objectives – the Program Objectives developed for the MokeWISE Program are summarized to augment the MAC and ESJ Region IRWM Objectives.
- Resource Management Strategies (RMS) – the RMS reflected in the implementation projects are summarized to supplement discussions contained within each existing IRWM Plan.
- Integration – stakeholder integration achieved through MokeWISE is described to supplement integration activities occurring at the regional level through the MAC and ESJ IRWM planning processes.
- Project Review Process – project concept descriptions and scopes of work are provided to allow projects to be prioritized by the MAC and ESJ Region IRWM project review processes.
- Impact and Benefit – impacts and benefits of the implementation projects are provided to supplement the MAC and ESJ IRWM Plan impacts and benefits discussions.
- Plan Performance and Monitoring – a proposed approach for monitoring effectiveness of each project, including performance measures and desired outcomes, is identified to supplement the Plan-level performance and monitoring discussions.

- Data Management – approaches for managing data developed through the MokeWISE Program, as well as data generated by implementation and tracking of the implementation projects, is summarized.
- Finance – the approach to funding / financing the implementation projects, as identified in the Implementation Plan, is summarized for inclusion in the respective IRWM Plans.
- Technical Analysis – the technical feasibility analysis of the implementation projects is be summarized.
- Relation to Local Water Planning – the consistency of implementation projects with local water planning is summarized to augment discussions in the MAC and ESJ IRWM Plans.
- Relation to Local Land Use Planning – the consistency of implementation projects with local land use planning is summarized to augment discussions in the MAC and ESJ IRWM Plans.
- Stakeholder Involvement – the stakeholder involvement efforts implemented as part of the MokeWISE Program and identified in Section 2 are summarized, including the outcomes from the Public and DAC Outreach Implementation effort.
- Coordination – the processes used to coordinate water management of participating local agencies and local stakeholders to avoid conflicts and take advantage of efficiencies, as well as the process of cooperating between adjacent IRWM planning efforts is discussed, along with opportunities for State agency assistance in implementation of the implementation projects.
- Climate Change – potential climate change adaptation and/ or mitigation benefits associated with the MokeWISE Program, including estimated greenhouse gas (GHG) emissions impacts, are summarized.

8 NEXT STEPS

Next Steps

With MokeWISE Program development complete, MCG member organizations will begin to show support for the MokeWISE Implementation Plan. It is recommended that MCG member entities introduce the MokeWISE Implementation Plan to their respective Boards and draft a resolution and/or letter of support appropriate for their Board. Board-approved resolutions will be included in the final MokeWISE plan.

There are three major next steps that would ensure MokeWISE projects are implemented in the future: (1) form structure for implementation; (2) develop and formalize stakeholder group; and (3) identify and secure funding for implementation.

The first step involves forming the group responsible for furthering the implementation of the MokeWISE projects. It is recommended that the GBA and UMRWA sign an MOU designating each as the lead agencies for soliciting, securing, and administering project funding.

The second step involves assembling a stakeholder group tasked with providing guidance during implementation of projects. A protocols document, outlining decision-making processes and organization, would be developed.

The third and final step includes identifying funding opportunities for each MokeWISE project, compiling funding applications, and securing and administering funding for project implementation. These steps are discussed in further detail below.

STEP 1: FORM STRUCTURE FOR IMPLEMENTATION

The initial step in MokeWISE program implementation is forming the structure that will support implementation. To this end, the GBA and UMRWA would begin to work together to identify agencies, organizations, and other members of the public that are interested in participating in the Implementation Group. Agencies and organizations interested in implementation may include project sponsors and other entities interested in implementation.

During this time, the GBA and UMRWA would begin drafting the MOU that would guide MokeWISE Program implementation. The MOU would specify that project sponsors would be ultimately responsible for implementing their respective projects, but that the GBA and UMRWA would act as the lead agencies for soliciting, securing, and administering funding for project being implemented in each of their regions, respectively, and for bi-regional projects (see **Section 6**). When a draft of the MOU is completed to the satisfaction of both the GBA and UMRWA, these two entities would sign the MOU. Having identified agencies and organizations interested in MokeWISE Program implementation, the GBA and UMRWA

would reach out to these entities to determine their desire to become signatories to the MOU. Those interested would also sign the MOU and become part of the Implementation Group.

STEP 2: DEVELOP AND FORMALIZE STAKEHOLDER GROUP

While identifying agencies for the Implementation Tier, the GBA and UMRWA would also identify agencies, organizations, and members of the public interested in participating in the Stakeholder and Public Involvement Tier. This group would advise the Implementation Tier on a programmatic level, including what projects to pursue funding for, changing needs for program implementation, etc. Once this stakeholder group has been assembled, process protocols would be developed. These protocols would guide the Stakeholder and Public Involvement group by outlining the organization of the group and the decision-making process; these protocols would be agreed upon by all members of the Stakeholder and Public Involvement group.

STEP 3: IDENTIFY AND SECURE FUNDING FOR PROJECT IMPLEMENTATION

In coordination with the Stakeholder and Public Involvement Tier, the Implementation Tier would begin to track funding opportunities appropriate for the various MokeWISE projects. Proposition 1, approved in November 2014, provides ample opportunities for funding a variety of water resource projects, including those in the MokeWISE Implementation Plan. **Table 17** in **Section 6** highlights the Proposition 1 opportunities for each MokeWISE project. For each MokeWISE project, the Implementation Tier would identify those funding opportunities providing the greatest potential. When appropriate, the GBA and UMRWA, in coordination with project sponsors, the Implementation Tier, and the Stakeholder and Public Involvement Tier, would pursue these funding opportunities. Any funding secured would be used for project implementation.

9 REFERENCES

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APPENDICES

Appendices

A: MCG MEMBER LIST

B: MCG PROTOCOLS TM

C: MCG MEETING SUMMARIES

D: PUBLIC AND DISAVANTAGED COMMUNITIES OUTREACH PLAN

E: PROGRAM OUTCOMES AND MEASURES TECHNICAL MEMORANDUM

F: ENVIRONMENTAL ASSESSMENT TECHNICAL MEMORANDUM

G: WATER AVAILABILITY ANALYSIS TECHNICAL MEMORANDUM

H: CLIMATE CHANGE TECHNICAL MEMORANDUM

I: CONCEPT LIST

J: PROJECT ASSESSMENT MEMORANDUM

K: PRELIMINARY SCREENING RESULTS

L: ENVIRONMENTAL ASSESSMENT

M: OBJECTIVES ASSESSMENT PROJECT CONCEPT BRIEFS

N: MCG APPROVED SCOPES

O: POLICIES AND INITIATIVES

P: SAMPLE MEMORANDUM OF UNDERSTANDINGS

Q: INTEGRATION CHAPTER