

Appendix Q: IRWM Integration Chapter

Appendix Q provides the Integrated Regional Water Management Plan Integration Chapter. This chapter is meant to be included as a stand-alone chapter in the IRWMPs of the MAC and ESJ regions and provides an overview of the MokeWISE outcomes.

**Integrated Regional Water Management Plan (IRWM) Integration
for the
MokeWISE Program**

1. Introduction.....	3
2. Stakeholder Involvement.....	4
3. Coordination	7
4. Governance.....	7
Implementation Tier	8
Stakeholder and Public Involvement Tier	10
5. Region Description.....	11
Watershed Overview	11
Regional Water Supply	12
6. Objectives	15
7. Resource Management Strategies (RMS)	19
8. Integration.....	22
9. Project Review Process.....	23
Preliminary Screening.....	23
Environmental / Technical Assessment	23
Objectives Assessment.....	24
Further Analysis	24
10. Impact and Benefit.....	24
11. Plan Performance and Monitoring.....	29

Tracking and Reporting Program Performance29

Project-Specific Data Collection and Monitoring Plans30

Using the Information Collected32

12. Data Management.....33

 Data Collection Techniques.....33

13. Finance.....37

14. Technical Analysis42

15. Relation to Local Water Planning42

16. Relation to Local Land Use Planning.....42

17. Climate Change.....43

Appendices.....48

Appendix A: Mokelumne Collaborative Group (MCG) Member List49

Appendix B: Baseline Environmental Conditions Technical Memorandum.....50

Appendix C: Water Availability Analysis51

Appendix D: Program Outcomes and Measures Memorandum52

Appendix E: MCG Approved Scopes of Work / Preliminary Engineering53

Appendix F: Environmental Assessment54

Appendix G: Local Water Use Planning References55

Appendix H: Local Land Use Planning References.....58

1. Introduction

The Mokelumne Watershed Interregional Sustainability Evaluation (MokeWISE) program was developed as a joint effort among the Mokelumne-Amador-Calaveras (MAC) and Eastern San Joaquin (ESJ) Integrated Regional Water Management (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. This memorandum summarizes information from the MokeWISE program that could be integrated into the regional plans. Appending this memorandum to the MAC and ESJ IRWM Plans is intended to functionally integrate this program into each respective regional effort. This memorandum addresses the following IRWM sections.

- 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 broadly supported projects.
- 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 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 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.
- Climate Change – potential climate change adaptation and/ or mitigation benefits associated with the MokeWISE program, including estimated greenhouse gas (GHG) emissions impacts, are summarized.

Each topic is discussed in further detail in the following sections.

2. Stakeholder Involvement

The Mokelumne Collaborative Group (MCG) is the stakeholder body that was established to serve as the driving influence 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 substantive 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, state, and federal government agencies. A list of the MCG member agencies can be found in **Appendix A**.

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.

- **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. There were 10 Tier 2 stakeholders. While Tier 2 stakeholders had no decision-making authority in the MCG, the MCG solicited feedback received from these stakeholders at various program milestones. There were no comments received from any Tier 2 stakeholders during the MokeWISE process on milestone documents. A Tier 2 stakeholder from the California Department of Fish and Game was part of the Modeling Workgroup and provided insight for the Water Availability Analysis effort (see **Regional Water Supply**).
- **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. There were 57 interested party members. During the first public outreach meeting, an interested party member suggested including a slogan for the MokeWISE program. Several slogans were submitted for consideration by students at the Argonaut High School in Jackson, CA. The MCG approved “It’s your watershed, your future – your voice matters!” This slogan was included on each subsequent outreach meeting flyer.
- **General public** included residents living in the upper and lower watershed and others with a potential and general interest in the MokeWISE program. At the first outreach meeting, three members of the general public were present; at the second meeting, four members were present; at the third meeting, 12 members were present; and at the fourth meeting, four members were present. Note that these individuals were added to the interested parties list after each meeting. No members of the public attended any of the MCG meetings.
- **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. MCG member entities representing DAC communities at MokeWISE meetings included, but were not limited to, Amador County, Calaveras County, City of Lodi, City of Stockton, San Joaquin County, the GBA, and UMRWA.

- **Native American** tribes in the region included the Ione and Jackson Rancheria Native American Bands. Direct outreach was performed to gauge 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.

Various outreach methods, including public workshops, press releases, flyers, website postings, and email notifications, were used to inform the stakeholder tiers of the MokeWISE program and progress. Five 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.

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. Press releases were sent to major newspapers within the watershed, as well as posted to the MokeWISE website and given to MCG members for posting. Flyers were also 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. Three members of the public attended the first outreach meeting, four new members attended the second meeting, six new members attended the third meeting, and no new members attended the fourth meeting.

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. There were no members of the public that spoke at any of the MCG meetings.

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 MokeWISE documents. There were no comments received from Tier 2 stakeholders or interested party members on milestone documents.

3. Coordination

The institutional arrangements detailed in the Governance section provides the framework for continued coordination between stakeholders in the MAC and ESJ regions. The Implementation Tier, arranged through a memorandum of understanding (MOU) between the Upper Mokelumne River Watershed Authority (UMRWA), the San Joaquin Groundwater Basin Authority (GBA), and other interested entities, is responsible for completing the MokeWISE Implementation Plan projects. A key element of this implementation is coordination with the Stakeholder and Public Involvement Tier. This tier includes interested individuals and / or organizations that would advise the Implementation Tier on implementation efforts, including which projects should apply for various funding opportunities and how to adapt to changing program implementation needs. To support coordination between the Implementation and Stakeholder and Outreach tiers, an annual meeting will be co-hosted by the GBA and UMRWA to discuss project implementation and funding opportunities and strategies. An additional coordination component is coordination with members of the public. Periodic public workshops and discussions will be held to provide status updates and solicit input from the public on the projects being implemented. The institutional structure comprised of the two tiers, provides the framework that allows for and provides opportunities for meaningful input from stakeholders and the public.

4. Governance

To implement projects included in the MokeWISE Implementation Plan, 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 determined that the preferred approach would involve two main tiers of responsibility. One tier or group 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).

Implementation Tier

The Implementation Tier 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, and for bi-regional projects (**Table 1**). The MOU 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. Project sponsors should avoid unilaterally modifying projects if they wish to retain the support gained from MCG participants over the 22-month course of the MokeWISE process.

Table 1: Lead Agency Responsible for MokeWISE Implementation Plan Projects

MOKEWISE IMPLEMENTATION PLAN PROJECT	GBA	UMRWA
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 River	✓	
1f. Riparian Restoration Program – Below Camanche River	✓	
1g. Mokelumne Water Quality, Soil Erosion & Sedimentation Inventory/ Monitoring		✓
2a. Municipal Recycled Wastewater Recharge Program	✓	
2b. Woodbridge Winery Wastewater Reuse	✓	
2c. Amador County 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 Program¹	✓	✓
5b. Regional Agriculture Conservation Program¹	✓	✓
7a. PG&E Storage Recovery		✓
7b. Raise Lower Bear Feasibility Study		✓
7d. Re-operation of Existing Storage		✓
7f. Blue & Twin Lakes Dams Reliability & Replacement Assessment		✓
8b. Rehabilitation of Transmission Main		✓
8c. Barney Way Septic System Conversion		✓
8d. Camanche Village Recycled Water Project		✓

Stakeholder and Public Involvement Tier

The Stakeholder and Public Involvement Tier would engage at two levels of completing Implementation Plan projects.

At the region level, existing stakeholder committees (the Regional Participants Committee in the MAC Region, and the GBA Coordinating Committee in the Eastern San Joaquin

¹ UMRWA will be responsible for those projects implemented in the upper watershed and the GBA will be responsible for those projects implemented in the lower watershed.

Region) would advise the implementation tier on what projects to pursue funding for, changing needs for program implementation, etc.

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 member organizations and potentially other members not currently involved in the process. 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 Implementation Plan progress. Membership in the stakeholder group would be open to organized entities and individual members of the public. As determined appropriate by the MCG legacy stakeholder group, public workshops would 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.

Additionally, at the project level, projects will each have unique stakeholder processes overseen by project sponsors, with input and/or coordination with stakeholders and other parties interested in that project.

5. Region Description

Watershed Overview

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.

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).

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.

More information about Mokelumne River and watershed conditions can be found in the Baseline Environmental Conditions report, included as **Appendix B**.

Regional Water Supply

Estimated quantities of supplies potentially available from groundwater, agricultural drainage water, recycled water, stormwater, conservation, desalination, Mokelumne River, and other surface water are summarized below.

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 acre-feet per year (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 East Bay Municipal Utility District (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 monetary costs associated with required infrastructure, costs associated with coordinating between various agencies, and the level of demand for recycled water.
- 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 gallons per capita per day (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 Bay Area Regional Desalination Project (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

- The MCG 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.
- 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.
- Unallocated water is highly variable based on year type and River location.
- Generally, there is more unallocated water in wetter years than in drier years.
- MokeWISE stakeholders recognize that there are likely to be disagreements about how much unallocated water is “available” for projects, and agreed to look at various definitions of availability in the context of specific projects.
- Modeling indicates that under both 2010 and 2040 baselines, more water is being released at both Joint Settlement Agreement (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.

More information about water availability within the Mokelumne Watershed can be found in the Water Availability Analysis, which is included as **Appendix C**.

6. Objectives

The MCG established priorities for the MokeWISE program intended to guide development of the MokeWISE program and provide a structure for gauging its success. These priorities developed into the MokeWISE Program Objectives to be Achieved and Consequences to be Avoided (“Program Objectives”). The Program Objectives served as a guide to determine how well the MokeWISE program addressed the priorities and objectives of the MCG. **Table 2** presents the MCG approved MokeWISE Program Objectives to be Achieved and **Table 3** presents the MCG approved MokeWISE Program Consequences to be Avoided which together constitute the Program Objectives. **Appendix D** includes the Program Outcomes and Measures Memorandum with more information.

Table 2: 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 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.
	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.
	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 the 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.
	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 CEQA/NEPA regulations.

Table 3: 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.
	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
Other Human Values	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.

7. Resource Management Strategies (RMS)

The Prop 84 IRWM Guidelines require consideration of the California Water Plan resource management strategies (RMS) in identifying regional projects and water management approaches. The RMS that would be addressed by the projects included in the MokeWISE Implementation Plan include:

- Agricultural Water Use Efficiency
- Conjunctive Management and Groundwater Storage
- Conveyance – Regional/Local
- Economic Incentives
- Ecosystem Restoration
- Flood Risk Management

- Matching Quality to Use
- Pollution Prevention
- Recharge Area Protection
- Recycled Municipal Water
- Sediment Management
- Surface Storage – Regional/Local
- System Reoperation
- Urban Runoff Management
- Urban Water Use Efficiency
- Water Transfers
- Watershed Management

Table 4 indicates which of the RMS each MokeWISE Implementation Plan project would address.

Table 4: Resource Management Strategies Addressed by the MokeWISE Implementation Plan

PROJECT	RMS IMPLEMENTED
1a. Re-Introduction of Fall-Run Chinook Salmon Upstream of Pardee Reservoir	<ul style="list-style-type: none"> • Ecosystem Restoration • Water-Dependent Recreation •
1b. High Country Meadow Restoration Program	<ul style="list-style-type: none"> • Ecosystem Restoration • Recharge Area Protection • Watershed Management • Flood Risk Management
1c. Mokelumne River Day Use Area Floodplain Habitat Restoration Project	<ul style="list-style-type: none"> • Ecosystem Restoration • Recharge Area Protection • Watershed Management • Flood Risk Management
1d. Fish Screens for Riparian Diversions in the Lower Mokelumne River	<ul style="list-style-type: none"> • Ecosystem Restoration • Watershed Management
1f. Riparian Restoration Program – Below Camanche River	<ul style="list-style-type: none"> • Ecosystem Restoration • Recharge Area Protection • Watershed Management

PROJECT	RMS IMPLEMENTED
	<ul style="list-style-type: none"> • Flood Risk Management
1g. Mokelumne Water Quality, Soil Erosion & Sedimentation Inventory/Monitoring	<ul style="list-style-type: none"> • Sediment Management • Watershed Management
2a. Municipal Recycled Wastewater Recharge Program	<ul style="list-style-type: none"> • Conjunctive Management and Groundwater Storage • Recycled Municipal Water • Matching Quality to Use • Pollution Prevention
2b. Woodbridge Winery Wastewater Reuse	<ul style="list-style-type: none"> • Conjunctive Management and Groundwater Storage • Recycled Municipal Water • Matching Quality to Use • Pollution Prevention
2c. Amador County Reuse	<ul style="list-style-type: none"> • Recycled Municipal Water • Matching Quality to Use • Pollution Prevention
4a. Groundwater Banking within the Eastern San Joaquin Groundwater Basin	<ul style="list-style-type: none"> • Water Transfers • Conjunctive Management and Groundwater Storage • Recharge Area Protection
4b. Amador and Calaveras Counties Hydrologic Assessment	<ul style="list-style-type: none"> • Water Transfers • Conjunctive Management and Groundwater Storage • Flood Risk Management
4d. NSJWCD Infrastructure Improvements	<ul style="list-style-type: none"> • Conveyance – Regional/Local • Conjunctive Management and Groundwater Storage • Recharge Area Protection
5a. Regional Urban Water Conservation Program	<ul style="list-style-type: none"> • Urban Water Use Efficiency • Matching Quality to Use • Pollution Prevention • Urban Runoff Management

PROJECT	RMS IMPLEMENTED
	<ul style="list-style-type: none"> • Economic Incentives
5b. Regional Agriculture Conservation Program	<ul style="list-style-type: none"> • Agricultural Water Use Efficiency
7a. PG&E Storage Recovery	<ul style="list-style-type: none"> • System Reoperation • Surface Storage – Regional/Local • Flood Risk Management
7b. Raise Lower Bear Feasibility Study	<ul style="list-style-type: none"> • System Reoperation • Water Transfers • Conjunctive Management and Groundwater Storage • Surface Storage – Regional/Local • Watershed Management • Flood Risk Management
7d. Re-operation of Existing Storage	<ul style="list-style-type: none"> • System Reoperation • Surface Storage – Regional/Local • Flood Risk Management
7f. Blue & Twin Lakes Dams Reliability & Replacement Assessment	<ul style="list-style-type: none"> • Surface Storage – Regional/Local • Flood Risk Management
8b. Rehabilitation of Transmission Main	<ul style="list-style-type: none"> • Urban Water Use Efficiency • Conveyance – Regional/Local
8c. Barney Way Septic System Conversion	<ul style="list-style-type: none"> • Pollution Prevention • Recharge Area Protection
8d. Camanche Village Recycled Water Project	<ul style="list-style-type: none"> • Recycled Municipal Water • Matching Quality to Use • Pollution Prevention

8. Integration

The MokeWISE program allows for maximizing opportunities for integration of water management activities. As shown in Table 3 in the Resources Management Strategies section of this technical memorandum, the MokeWISE Implementation Plan integrates 17 resource management strategies.

In addition, the governance structure, as previously described, fosters integration by allowing a diverse group of stakeholders and interested parties to participate at all levels of the planning process. Cities, water agencies/districts, irrigation districts, wastewater agencies, non-governmental organizations (NGOs), DACs, private corporations, public utility districts, community organizations, watershed stakeholders, and the general public can each play a key role in the planning process, regardless of their ability to contribute to the process financially. With a diverse group of participants in the planning process, different views can be represented and through collaboration, a multi-benefit, implementable program can be prepared.

9. Project Review Process

Each of the projects brainstormed and synthesized by the MCG underwent four assessments (**Figure 1**). 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.

Figure 1: Project Review Process Overview



Preliminary Screening

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.

Environmental / Technical Assessment

Projects passing the preliminary screening were assessed against environmental criteria as well as technical feasibility. This assessment did not result in any projects being removed from the process, but provided the MCG with information about the

environmental merits and anticipated technical feasibility of each project. The information provided in this assessment was then incorporated into the third assessment.

Objectives Assessment

The third 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.

Further Analysis

Following the three assessments, 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 provide a MCG member entity from allowing it to move forward to implementation. At this stage, key study components were added to some projects to get answers to questions affecting support for future project implementation. For each project 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. At this stage, stakeholder interests in projects were identified, and key project components, limitations, and disclosures were added to address these stakeholder interests. The scopes of work, which will provide information needed for other future review processes, are included in **Appendix E**.

10. Impact and Benefit

Anticipated impacts associated with completing the MokeWISE Implementation Plan include fishery, geomorphic, and cultural impacts. Fishery and geomorphic impacts vary across individual projects, so each project 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. Anticipated impacts to fisheries include decreases to instream flows which could affect habitat conditions. Anticipated geomorphic impacts include decreased sediment and nutrient mobility due to decreased River flows. **Appendix F** includes the Environmental Assessment, which presents the fishery and geomorphic impacts associated with each MokeWISE project concept.

A preliminary cultural assessment performed on three of the projects with well-defined areas indicates that these projects could have cultural impacts. Results of the cultural assessment identify 24 archeological resources within the 8,400 acre search area. The majority of the sites are related to mining activities and associated settlements along the Mokelumne River. Others are food production sites with small habitation areas. CEQA Guidelines require that the significance of potential project impacts to these 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.

Benefits of completing the MokeWISE Implementation Plan 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

Table 5 summarizes the anticipated 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 5: Potential MokeWISE Project Benefits

PROJECT	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			✓		✓			✓	✓	
	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	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	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			✓		✓		✓	✓	✓	✓
	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	✓	✓	✓		✓			✓	✓	
	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	✓	✓	✓		✓		✓	✓	✓	✓
	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	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	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	✓	✓						✓		✓
	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.									
2b Constellation Winery Wastewater Reuse	✓	✓						✓	✓	✓
	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.									
	✓	✓		✓		✓		✓		✓

PROJECT	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
2c Amador County Regional Reuse	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*	✓	✓	✓				✓	✓	✓	✓
	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*	✓	✓	✓					✓	✓	✓
	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		✓						✓		✓
	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	✓			✓	✓	✓		✓	✓	✓
	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		✓		✓	✓	✓		✓	✓	✓
	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.									
7a PG&E Storage Recovery*	✓	✓		✓	✓	✓	✓	✓	✓	
	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*	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	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*	✓	✓		✓	✓	✓	✓	✓	✓	
	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.									

PROJECT	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
7f Blue and Twin Lakes Dams Reliability and Replacement Assessment*	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	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	✓	✓		✓	✓	✓		✓	✓	✓
	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					✓			✓	✓	✓
	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*	✓	✓		✓	✓	✓		✓	✓	✓
	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.									

11. Plan Performance and Monitoring

The intent of the Plan Performance and Monitoring section is to confirm that the MokeWISE Implementation Plan projects are making progress toward meeting the MokeWISE program objectives, is implementing projects as identified in the program, and is ensuring that each implementation project is monitored to comply with all applicable rules, laws, and permit requirements.

Tracking and Reporting Program Performance

A Performance Review will be conducted, at a minimum, every three years (or as deemed appropriate by the implementation governance structure) to evaluate progress made toward achieving program objectives. The Performance Review will be administered by the Implementation Tier and vetted thorough the existing regional stakeholder committees or through the legacy MCG stakeholder group, or both.

Two tables will be generated with each Performance Review: one that addresses the extent to which the objectives have been met, and one that describes progress made in implementing the Implementation Plan projects. The first table, which will be entitled ‘Progress Toward Achieving Objectives’, will report the performance measure data collected for the projects being implemented.

The second table, which will be entitled “Status of Project Implementation” will list all of the Implementation Plan projects, their implementation status, and funding source. Projects that have been fully implemented will be highlighted separately.

Templates of these tables are provided below (**Table 6** and **Table 7**).

Table 6: Example Reporting Template: Progress toward Achieving Objectives

OBJECTIVE	PERFORMANCE MEASURES	MONITORING/REPORTING RESULT
Objective 1	Performance Measure 1	Reporting Result

Table 7: Example Reporting Template: Status of Project Implementation

SPONSOR	PROJECT	STATUS OF PROJECT IMPLEMENTATION
1 Sponsor Name	Project Name	Project Status

Project-Specific Data Collection and Monitoring Plans

Sponsors of projects implemented as part of the MokeWISE Implementation Plan will be required to develop project-specific monitoring plans prior to or in conjunction with project implementation. Project sponsors will be responsible for collecting the data consistent with MokeWISE requirements for compatibility with statewide databases (refer to data management section below), performing the monitoring activities, validating the data for compatibility with statewide databases, and reporting to UMRWA, the GBA, and appropriate state databases. For projects that receive implementation grant funding from the California Department of Water Resources (DWR), UMRWA or the GBA will act as the overseeing entity (consistent with the governance approach described previously), ensuring that each project sponsor prepares its project-specific monitoring plan(s) and implements the plan(s) accordingly. Monitoring plans will include schedules with an estimated timeline of monitoring activities, which will be used as a guideline for overall program implementation. Data collected and analyses performed as part of the performance monitoring plans will be reported to UMRWA or the GBA and appropriate statewide databases on a quarterly basis, along with required documentation and an evaluation of project performance. This will help ensure that implemented projects fulfill the program objectives as originally intended.

Project-specific monitoring plan requirements will vary based on the type of project being implemented. All projects must adhere to appropriate State guidelines for monitoring, depending upon the type of data being collected, in order to be implemented through the IRWM Plan. These include:

- Projects that involve surface water quality must meet the criteria for and be compatible with the Surface Water Ambient Monitoring Program (SWAMP, http://www.waterboards.ca.gov/water_issues/programs/swamp/tools.shtml).
- All projects that involve groundwater quality must meet the criteria for and be compatible with the Groundwater Ambient Monitoring and Assessment Program (GAMA, <http://www.waterboards.ca.gov/gama/>).

- All projects that involve wetland restoration must meet the criteria for and be compatible with the State Wetland and Riparian Area Monitoring Plan (WRAMP, http://www.waterboards.ca.gov/mywaterquality/monitoring_council/wetland_workgroup/docs/2010/tenetsprogram.pdf)

All project-specific monitoring plans must include the following:

1. A table describing what is being monitored for the project (e.g. water quality, water depth, flood frequency), and effects the project may have on habitat or particular species (before and after construction).
2. Measures to remedy or react to problems encountered during monitoring.
3. Location of monitoring.
4. Monitoring frequency.
5. Monitoring protocols/methodologies and quality assurance and quality control (QA/QC) procedures, including who will perform the monitoring.
6. A description of how those monitoring protocols / methodologies and QA / QC procedures are consistent with requirements for applicable statewide databases including SWAMP, GAMA, and WRAMP)
7. An identified data management system (DMS) that will be used or procedures to keep track of what is monitored.
8. Procedures and a schedule for incorporating collected data into statewide database(s).
9. Procedures and a schedule for reporting to UMRWA confirmation of data submittal to appropriate statewide database(s).
10. Procedures to ensure the monitoring schedule is maintained and that adequate funding is available to maintain monitoring of the project throughout the scheduled monitoring timeframe

The project sponsor will be responsible for completed data collection in accordance with the approved project-specific monitoring plan, which will clearly identify monitoring and analytical techniques and QA/QC procedures to be implemented, and will describe how those techniques are compatible with the requirements of appropriate statewide database(s). The individual project sponsor will be responsible for reviewing the data collection and QA/QC protocols to validate that data was collected in accordance with

QA/QC procedures required as part of the project monitoring program. In addition, project sponsors will be responsible for “spot-checking” all data for accuracy at the time of entry to the database to identify any apparent errors. Once data collection and QA/QC has been complete in accordance with provisions of the approved project-specific monitoring plan, the project sponsor will submit the compatible data to the appropriate statewide database, as well as to UMRWA or the GBA for inclusion in the respective IRWM Regions’ DMS. The project sponsor will also provide UMRWA or the GBA with confirmation that the data has been submitted to the appropriate statewide database.

UMRWA and the GBA will each maintain the centralized DMS as discussed in their respective IRWM Plans. The data will be maintained by UMRWA and the GBA and copies of all data will be available to stakeholders and members of the public on request. Data management is discussed in greater detail in the following section.

Using the Information Collected

The Performance Review process will include an adaptive management component which will allow UMRWA, the GBA, and the legacy MCG to respond to lessons learned from analyzing collected performance measure and project monitoring data. With this information, UMRWA, the GBA, and the legacy MCG may consider modifying program implementation.

Local agencies implementing projects as part of the MokeWISE Implementation Plan will monitor for the parameters identified in order to identify when their projects may not be fulfilling their objectives. This information will be fed back into the project’s decision-making structure to adapt the project to better meet its overall objectives. Only by consistent monitoring and analysis can projects successfully achieve their objectives. Monitoring will also provide a clear reporting mechanism for the public, decision-makers, and regional planners to determine the planned versus actual value of the project. The results of project-specific monitoring efforts will be utilized to identify areas where implementation may need to be modified to best achieve objectives moving forward.

For those Implementation Plan projects that may be implemented independently from the MokeWISE program, project sponsors will be encouraged to prepare and administer project-specific monitoring plans that are generally consistent with the monitoring plans described above. During the Performance Review, UMRWA and the GBA will assess the extent to which the program objectives have been met, based on the projects and programs completed throughout the Regions. In this way, progress made toward achieving MokeWISE program objectives by projects implemented outside of the MokeWISE program will be assimilated into the Plan Performance Review, though specific monitoring data may not be made available by project sponsors to the centralized DMS.

12. Data Management

The Data Management section is intended to ensure the efficient use of available data, describe stakeholder access to data, and ensure the data generated by implementation activities can be integrated into existing State databases.

Data Collection Techniques

Data associated with the design and implementation of Implementation Plan projects will depend upon project type, but may include streamflow, surface water deliveries, groundwater elevations, groundwater pumping, precipitation, water demand, locations and sizes of water-related facilities, political and agency boundaries, land use, contaminant plume location and extent, water quality data, locations of sensitive habitats and species, and hydrogeologic and hydrologic data. These data will be collected from various federal, state, and local sources. Data may also be developed by project sponsors using numerical models such as HEC, H2ONet, and various hydraulic and hydrologic models.

Data collected in conjunction with completing the Implementation Plan will vary based on the type and scope of each individual project. These data will include, at a minimum, data relevant to surface water, groundwater, water quality, stormwater, and ecosystem restoration. **Table 8** indicates the types of data to be collected for the various project types.

Table 8: Data to be Collected through MokeWISE Project Implementation

DATA TYPE	PROJECT TYPE					
	Water Supply	Recycled Water	Water Quality	Stormwater and Flood Management	Ecosystem Restoration	Groundwater Management
Stream & River Flows	X		X		X	
Stream & River Water Quality	X	X	X	X	X	
Locations of Sensitive Habitats & Species			X		X	
Surface Water Deliveries	X		X			X
Groundwater Pumping	X		X			X
Hydrogeologic						X
Precipitation	X		X	X		X
Water Demand	X	X				X
Water Related Facilities	X	X	X	X		X
Political and Agency Boundaries	X	X	X	X	X	X
Land Use	X	X	X	X	X	X
Contaminant Plume Locations and Extents	X		X			X

As described in the Plan Performance and Monitoring section, project sponsors implementing projects through the MokeWISE Implementation Plan will be required to prepare project-specific monitoring plans that adhere to the data collection techniques and procedures established by the following statewide programs. This will ensure compatibility of data among projects, as well as compatibility with relevant statewide databases.

SWAMP: Typical data collection techniques for surface waters include both field measurements and laboratory analysis. Field measurements are either collected using meters or field kits for a common list of constituents including but not limited to: water

temperature, pH, conductivity, dissolved oxygen and turbidity. For an example of a field data sheet and complete list of SWAMP-required fields go to: http://swamp.mpsl.mlml.calstate.edu/wp-content/uploads/2009/04/swamp_sop_field_measures_water_sediment_collection_v1_0.pdf.

There is a large list of possible constituents that are measured in surface waters that require laboratory analysis. Typical laboratory analysis includes fecal indicator bacteria, metals, nutrients, persistent organic pollutants, and turbidity. SWAMP provides guidance on methods and quality assurance. This guidance can be found at:

http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/qapp/qaprp082209.pdf.

Biological monitoring is helpful for determining the health of a system and whether it is able to sustain a diverse community of benthic macro invertebrates. Standard operating procedures for determining a stream's physical/habitat condition and benthic invertebrate assemblages can be found at:

http://swamp.mpsl.mlml.calstate.edu/wp-content/uploads/2009/04/swamp_sop_bioassessment_collection_020107.pdf.

Projects collecting surface water data will be required to adhere to the SWAMP data collection protocols.

GAMA: The GAMA Priority Basin Project is grouped into 35 groundwater basin groups called “study units.” Each study unit is sampled for common contaminants regulated by the California Department of Public Health (CDPH), and also for unregulated chemicals. Testing for these chemicals—usually at detection levels well below those achieved by most laboratories—will help public and private groundwater users to manage this resource. Results from the Northern San Joaquin study unit, which includes the western-most portion of the MAC Region (Amador and Calaveras Counties), can be found at <http://pubs.usgs.gov/fs/2011/3089/>. Some of the chemical constituents that are sampled by the GAMA Priority Basin Project include:

- Low-level volatile organic compounds (VOCs)
- Low-level pesticides
- Stable isotopes of oxygen, hydrogen, and carbon
- Emerging contaminants (pharmaceuticals, perchlorate, chromium VI, and other chemicals)
- Trace metals (arsenic, selenium, lead, and other metals)
- Radon, radium, and gross alpha/beta radioactivity

- General ions (calcium, magnesium, fluoride)
- Nutrients, including nitrate, and phosphates
- Bacteria: total and fecal coliform bacteria

Projects collecting groundwater data will be required to adhere to GAMA data collection protocols.

WRAMP: The WRAMP is intended to track trends in wetland extent and condition to determine the performance of wetland, stream, and riparian protection programs in California. The program defines standardized assessment methods and data management with the goal of minimizing new costs and maximizing public access to assessment information. Additional information on the WRAMP program can be found at the following location

http://www.waterboards.ca.gov/mywaterquality/monitoring_council/wetland_workgroup/docs/2010/tenetsprogram.pdf

All projects that involve wetland restoration must meet the criteria for and be compatible with the State Wetland and Riparian Area Monitoring Plan.

As described previously, individual project sponsors will be responsible for collecting data in accordance with the approved project-specific monitoring plan, which will clearly identify monitoring and analytical techniques and QA/QC procedures to be implemented, and will describe how those techniques are compatible with the requirements of appropriate statewide database(s). The individual project sponsor will be responsible for reviewing the data collection and QA/QC protocols to validate that data was collected in accordance with QA/QC procedures required as part of the project monitoring program. In addition, project sponsors will be responsible for “spot-checking” all data for accuracy at the time of entry to the database to identify any apparent errors. Once data collection and QA/QC has been complete in accordance with provisions of the approved project-specific monitoring plan, the project sponsor will submit the compatible data to the appropriate statewide database, as well as to UMRWA and the GBA for inclusion in the respective Regions’ centralized data management systems (DMS). The project sponsor will also provide UMRWA and the GBA with confirmation that the data has been submitted to the appropriate statewide database.

Data dissemination will be accomplished through the existing MAC and ESJ IRWM processes.

13. Finance

Conceptual-level estimates of capital and operations and maintenance costs were developed for the projects included in the MokeWISE Implementation Plan. 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. As a result, it is expected that a high degree of outside funding will be necessary to implement the projects included in the MokeWISE Implementation Plan.

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 Implementation Plan, and the funds could potentially offset a significant portion of the cost to implement the recommended projects.

Based on the Proposition 1 funding schedule and identification of potentially-eligible MokeWISE project types, it is recommended that the GBA and UMRWA, review and track development of each proposal solicitation process. Upon Prop 1 program guidelines being published, UMRWA and the GBA should consult with project sponsors to determine which, if any, projects may be eligible, to what extent the projects may be competitive, whether local march funds are available, and what funding is available to pay the costs for completing the identified grant applications. 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.

Table 9 summarizes the anticipated capital and operations and maintenance costs for each MokeWISE Implementation Plan project and identifies whether existing revenue sources

may be available to offset a portion of the project cost. In addition, this table identifies which Proposition 1 program or programs should be evaluated for their ability to provide additional potential funding for each project.

Table 9: Estimated MokeWISE Implementation Plan Project Costs and Potential Funding Sources

Project	General Project Type	Estimated Project Cost	Potential for Water / Wastewater Rate Funding?	Potential Proposition 1 Funding Opportunities															
				SWRCB - Small Community Wastewater	SWRCB - Clean, Safe and Reliable Drinking Water	San Joaquin River Conservancy - SIR 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 Sustainability	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		✓						✓						✓		
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	✓	✓						✓						✓		

Project	General Project Type	Estimated Project Cost	Potential for Water / Wastewater Rate Funding?	Potential Proposition 1 Funding Opportunities															
				SWRCB - Small Community Wastewater	SWRCB - Clean, Safe and Reliable Drinking Water	San Joaquin River Conservancy - SJR 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 Sustainability	DWR - Groundwater Plans and Project Grant Program - Phase 1	DWR and Central Valley Flood Protection Board - Flood Management
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		✓								✓	✓					
7a PG&E Storage Recovery	Storage	\$350,000 for study preparation	Y		✓								✓		✓				
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		✓								✓		✓				
8b Rehab of Transmission Main	Water Conservation	\$1.03 million (includes \$30,000 for the study and \$1 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	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						

Project	General Project Type	Estimated Project Cost	Potential for Water / Wastewater Rate Funding?	Potential Proposition 1 Funding Opportunities															
				SWRCB - Small Community Wastewater	SWRCB - Clean, Safe and Reliable Drinking Water	San Joaquin River Conservancy - SJR 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 Sustainability	DWR - Groundwater Plans and Project Grant Program - Phase 1	DWR and Central Valley Flood Protection Board - Flood Management
8d Lake Camanche Village Recycled Water Project	Recycled Water	\$150,000 for study completion	Y	✓	✓							✓				✓			

14. Technical Analysis

Proposed implementation projects were assessed for their technical feasibility at two points in the MoKeWISE program. The preliminary screening step identified in the Project Review Process Table 1 included a “feasible” screen. This screen included using engineering judgment to determine whether a project was likely to be found technically feasible.

In addition, projects that moved beyond the initial screen underwent a second screen to assess anticipated environmental benefits / impacts and technical feasibility. The results of this assessment are provided in **Appendix F**.

Finally, projects included in the implementation plan underwent “preliminary engineering.” Because the projects were primarily conceptual in nature, this preliminary engineering consisted primarily of expanded and enhanced project descriptions and scopes of work. These scopes often included completing more detailed technical analyses to identify the parameters within which the projects will meet the MoKeWISE objectives of being economically, socially, and environmentally acceptable. Examples of reference projects that demonstrate technical feasibility were provided and referenced in these expanded project write-ups. The expanded project descriptions / conceptual engineering can be found in **Appendix E**.

15. Relation to Local Water Planning

The projects identified for implementation in the MoKeWISE Implementation Plan are consistent with and based upon local water planning documents. The Implementation Plan projects were developed and analyzed using information contained in published local water planning documents such as urban water management plans, as well as the MAC and ESJ Region IRWM Plans, which are also based upon local planning documents. The MoKeWISE program coalesces and builds upon local and regional water planning information at an interregional level; it does not supersede local or regional water planning documentation.

Referenced local water planning documents that serve as the basis for the data, analyses, and projects in the MoKeWISE program can be found in **Appendix G**.

16. Relation to Local Land Use Planning

The projects identified for implementation in the MoKeWISE Implementation Plan are consistent with and based upon local land use planning documents. The Implementation Plan

projects were developed and analyzed using information contained in published local land use planning documents, such as adopted general plans, as well as the MAC and ESJ Region IRWM Plans, which are also based upon local planning documents. The MokeWISE program coalesces and builds upon local and regional land use planning information at an interregional level; it does not supersede local or regional land use planning documentation.

The MokeWISE process acknowledged the benefits that could be achieved through better coordination among water utilities and local land use planning agencies. Policy 9a, Land Use Coordination, was drafted and approved to start improving this coordination.

Referenced local land use planning documents that serve as the basis for the data, analyses, and projects in the MokeWISE program can be found in **Appendix H**.

17. Climate Change

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 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.

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. Climate change adaptation and/or mitigation benefits associated with projects included in the MokeWISE Implementation Plan are shown in **Table 10**.

Table 10: Potential Climate Change Benefits of the MoKeWISE Implementation Plan

MOKEWISE PROJECT	RELATED CLIMATE CHANGE VULNERABILITIES	ADAPTATION STRATEGIES IMPLEMENTED	GREENHOUSE GAS MITIGATION EFFECTS
1a. Re-Introduction of Fall-Run Chinook Salmon Upstream of Pardee Reservoir	<ul style="list-style-type: none"> • Impacted ecosystem and habitat 	<ul style="list-style-type: none"> • Ecosystem Restoration • Water-Dependent Recreation • Flood Risk Management 	<ul style="list-style-type: none"> • None
1b. High Country Meadow Restoration Program	<ul style="list-style-type: none"> • Degraded surface water and groundwater quality Impacted ecosystems and habitat 	<ul style="list-style-type: none"> • Ecosystem Restoration • Recharge Area Protection • Watershed Management • Flood Risk Management 	<ul style="list-style-type: none"> • Carbon Sequestration
1c. Mokelumne River Day Use Area Floodplain Habitat Restoration Project	<ul style="list-style-type: none"> • Increased flooding • Impacted ecosystem and habitat 	<ul style="list-style-type: none"> • Ecosystem Restoration • Recharge Area Protection • Watershed Management • Flood Risk Management 	<ul style="list-style-type: none"> • Carbon Sequestration
1d. Fish Screens for Riparian Diversions in the Lower Mokelumne River	<ul style="list-style-type: none"> • Impacted ecosystems and habitat 	<ul style="list-style-type: none"> • Watershed Management 	<ul style="list-style-type: none"> • None
1f. Riparian Restoration Program – Below Camanche River	<ul style="list-style-type: none"> • Degraded surface water and groundwater quality Increased flooding • Impacted ecosystems and habitat 	<ul style="list-style-type: none"> • Ecosystem Restoration • Recharge Area Protection • Watershed Management • Flood Risk Management 	<ul style="list-style-type: none"> • Carbon Sequestration
1g. Mokelumne Water Quality, Soil Erosion & Sedimentation Inventory/Monitoring	<ul style="list-style-type: none"> • Decreased surface water quality 	<ul style="list-style-type: none"> • Sediment Management • Watershed Management 	<ul style="list-style-type: none"> • None
2a. Municipal Recycled Wastewater Recharge Program	<ul style="list-style-type: none"> • Decreased water supply / Water table decline • Degraded surface water and groundwater quality 	<ul style="list-style-type: none"> • Conjunctive Management and Groundwater Storage • Recycled Municipal Water • Matching Quality to Use 	<ul style="list-style-type: none"> • Energy Efficiency • Emissions Reduction

MOKEWISE PROJECT	RELATED CLIMATE CHANGE VULNERABILITIES	ADAPTATION STRATEGIES IMPLEMENTED	GREENHOUSE GAS MITIGATION EFFECTS
		<ul style="list-style-type: none"> • Pollution Prevention 	
2b. Woodbridge Winery Wastewater Reuse	<ul style="list-style-type: none"> • Decreased water supply • Degraded surface water and groundwater quality 	<ul style="list-style-type: none"> • Conjunctive Management and Groundwater Storage • Recycled Municipal Water • Matching Quality to Use • Pollution Prevention 	<ul style="list-style-type: none"> • Energy Efficiency • Emissions Reduction
2c. Amador County Reuse	<ul style="list-style-type: none"> • Decreased water supply • Degraded surface water and groundwater quality 	<ul style="list-style-type: none"> • Recycled Municipal Water • Matching Quality to Use • Pollution Prevention 	<ul style="list-style-type: none"> • Energy Efficiency • Emissions Reduction
4a. Groundwater Banking within the Eastern San Joaquin Groundwater Basin	<ul style="list-style-type: none"> • Decreased water supply / Water table decline • Degraded surface water and groundwater quality 	<ul style="list-style-type: none"> • Water Transfers • Conjunctive Management and Groundwater Storage 	<ul style="list-style-type: none"> • Energy Efficiency • Emissions Reduction
4b. Amador and Calaveras Counties Hydrologic Assessment	<ul style="list-style-type: none"> • Decreased water supply / Water table decline • Degraded surface and groundwater quality 	<ul style="list-style-type: none"> • Water Transfers • Conjunctive Management and Groundwater Storage • Flood Risk Management 	<ul style="list-style-type: none"> • Energy Efficiency • Emissions Reduction
4d. NSJWCD Infrastructure Improvements	<ul style="list-style-type: none"> • Decreased water supply / Decreased water supply / Water table decline 	<ul style="list-style-type: none"> • Conveyance – Regional/Local 	<ul style="list-style-type: none"> • Energy Efficiency • Emissions Reduction

MOKEWISE PROJECT	RELATED CLIMATE CHANGE VULNERABILITIES	ADAPTATION STRATEGIES IMPLEMENTED	GREENHOUSE GAS MITIGATION EFFECTS
5a. Regional Urban Water Conservation Program	<ul style="list-style-type: none"> Increased domestic / urban and commercial, industrial and institutional (CII) demands Degraded surface water and groundwater quality 	<ul style="list-style-type: none"> Urban Water Use Efficiency Matching Quality to Use Pollution Prevention Urban Runoff Management Economic Incentives 	<ul style="list-style-type: none"> Energy Efficiency Emissions Reduction
5b. Regional Agriculture Conservation Program	<ul style="list-style-type: none"> Increased agricultural demands Degraded surface water and groundwater quality 	<ul style="list-style-type: none"> Agricultural Water Use Efficiency 	<ul style="list-style-type: none"> Energy Efficiency Emissions Reduction Carbon Sequestration
7a. PG&E Storage Recovery	<ul style="list-style-type: none"> Decreased water supply Increased seasonal flooding 	<ul style="list-style-type: none"> Surface Storage – Regional/Local Flood Risk Management 	<ul style="list-style-type: none"> Energy Efficiency Emissions Reduction
7b. Raise Lower Bear Feasibility Study	<ul style="list-style-type: none"> Decreased water supply Increased seasonal flooding 	<ul style="list-style-type: none"> System Reoperation Water Transfers Conjunctive Management and Groundwater Storage Surface Storage – Regional/Local Watershed Management Flood Risk Management 	<ul style="list-style-type: none"> Energy Efficiency Emissions Reduction Carbon Sequestration
7d. Re-operation of Existing Storage	<ul style="list-style-type: none"> Increased seasonal flooding Reduced hydropower generation 	<ul style="list-style-type: none"> System Reoperation Surface Storage – Regional/Local Flood Risk Management 	<ul style="list-style-type: none"> Energy Efficiency Emissions Reduction
7f. Blue & Twin Lakes Dams Reliability & Replacement Assessment	<ul style="list-style-type: none"> Decreased Water Supply Increased Seasonal Floods 	<ul style="list-style-type: none"> Local/Regional Surface Storage 	<ul style="list-style-type: none"> Energy Efficiency Emissions Reduction
8b. Rehabilitation of Transmission Main	<ul style="list-style-type: none"> Decreased water supply 	<ul style="list-style-type: none"> Urban Water Use Efficiency Conveyance – Regional/Local 	<ul style="list-style-type: none"> Energy Efficiency

MOKEWISE PROJECT	RELATED CLIMATE CHANGE VULNERABILITIES	ADAPTATION STRATEGIES IMPLEMENTED	GREENHOUSE GAS MITIGATION EFFECTS
			<ul style="list-style-type: none"> • Emissions Reduction
8c. Barney Way Septic System Conversion	<ul style="list-style-type: none"> • Decreased water supply • Degraded surface water and groundwater quality 	<ul style="list-style-type: none"> • Pollution Prevention • Recharge Area Protection 	<ul style="list-style-type: none"> • None
8d. Camanche Village Recycled Water Project	<ul style="list-style-type: none"> • Decreased water supply • Degraded surface water and groundwater quality 	<ul style="list-style-type: none"> • Recycled Municipal Water • Matching Quality to Use • Pollution Prevention 	<ul style="list-style-type: none"> • Energy Efficiency • Emissions Reduction

Appendices

- A: MCG Member List
- B: Baseline Environmental Conditions Technical Memorandum
- C: Water Availability Analysis
- D: Program Outcomes and Measures Memorandum
- E: MCG Approved Scopes of Work / Preliminary Engineering
- F: Environmental Assessment
- G: Local Water Planning References
- H: Local Land Use Planning References

Appendix A: Mokolunne Collaborative Group (MCG) Member List

Please reference Appendix A in Draft Final Plan.

Appendix B: Baseline Environmental Conditions Technical Memorandum

Please reference Appendix F in Draft Final Plan.

Appendix C: Water Availability Analysis

Please reference Appendix G in Draft Final Plan.

Appendix D: Program Outcomes and Measures Memorandum

Please reference Appendix E in Draft Final Plan.

Appendix E: MCG Approved Scopes of Work / Preliminary Engineering

Please reference Appendix N in Draft Final Plan.

Appendix F: Environmental Assessment

Please reference Appendix L in Draft Final Plan.

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